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Early Warning Signs of Failures in Offshore Outsourced Software Development Projects at the Team Level

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If you're unable to stay ahead of a potential disaster as it unfolds, you'll be stuck in a reactive mode. You'll become a victim of circumstances rather than a master of your own destiny. (Watkins and Bazerman 2003)

But, as we look to the horizon of a decade hence, we see no silver bullet. There is no single development, in either technology or in management technique, that by itself promises even one order-of-magnitude improvement in productivity, in reliability, in simplicity. (Brooks 1987)

Abstract

Offshore outsourcing of IT services to low-cost countries such as India and China has experienced tremendous growth since the 1990s; this trend is expected to continue in the near future. Among IT services, software development – because of high information intensity and little need for customer and physical presence – is one of the ideal candidates for outsourcing to offshore countries. However, software projects are notoriously difficult to manage even in conditions of co-location. Despite the risks inherent in offshore-outsourced software development (OOSD) projects, organizations in high-cost countries have come to rely increasingly on offshore outsourcing to meet their software development needs.

Software projects continue to fail despite the accumulation of knowledge over the past decades. In team-oriented activities such as software projects, a team-level study is the key to understanding failures. Using the grounded theory methodology, we explored 19 project cases of OOSD failures from the team perspective, examining both the client and the vendor sides. Project managers engaged in OOSD projects from multi-national corporations in India and Switzerland served as the key informants of this research. This research allowed us to develop exploratory insights regarding OOSD project failures, particularly regarding how indications of failure manifest themselves in the early project stages.

We analyzed failed OOSD projects with particular attention to the team level. Based on the unique team-level aspects that emerged from our study, we formulated theoretical propositions to emphasize the integration of the teams involved – client onshore, vendor onshore and vendor offshore teams – into a single project team. Our research emphasizes the importance of team members' shared understanding of the organizational and professional cultures of onshore and offshore teams. In particular, we found that the integration of organizational work practices within the project team is of crucial importance in avoiding project failures.

In order to understand the dynamics of project teams during early project stages, and to offer project managers a predictive tool to avoid failures in OOSD projects, we studied the early warning signs (EWS) of failure, a project management tool that aids in the detection of project issues in advance. We identified six categories of EWSs of failure relevant to the onshore-offshore project environment. While the literature generally emphasizes the interaction between client and vendor teams, our work found the interactions between the vendor onshore and vendor offshore teams to be equally relevant to avoiding project failures. We further distinguished the EWSs of failure into early signals – concrete indications that are more easily noticed by project managers – and the early warning issues with which the early signals are associated. We then developed an exploratory model of OOSD project failures that incorporates the EWSs of failure in an effort to understand the failure process, particularly in the early project stages.

Our analysis regarding the perception and management of EWSs of failure by project managers resulted in a model that consists of four management stages among clients and vendors – monitoring for EWSs, detection of EWSs, acknowledging issues, and addressing issues. Each stage of EWS management was found to be increasingly difficult to reach. We identified the reasons why managing issues failed in each particular stage, and found that the lack of adequate onshore-offshore project experience was of particular significance in the failure to detect and act upon EWSs.

Our exploratory research contributes to the research literature on IS failure and IT outsourcing, taking a topic that has been the focus of few empirical studies – project failure – and shedding light on the issues and contexts that lead to failures in offshore outsourcing projects that involve various organizations on different continents.

Zusammenfassung

Das Offshore-Outsourcing von IT-Dienstleistungen in günstige Länder wie Indien und China hat seit den 1990er Jahren ein enormes Wachstum erlebt. Diese Entwicklung wird sich voraussichtlich in naher Zukunft fortsetzen. Aufgrund der hohen Informationsintensität und der geringen Notwendigkeit von Tätigkeiten vor Ort sowie der Kundenpräsens, ist die Software-Entwicklung unter den IT-Dienstleistungen ein idealer Kandidat für das Offshore Outsourcing. Allerdings sind Software-Projekte, sogar wenn sie am gleichen Ort durchgeführt werden, für ihre schwierige Führung berüchtigt. Trotz der inhärenten Risiken von Software-Outsourcing-Projekten in Offshore-Länder (Offshore-outsourced software development auf Englisch; abgekürzt OOSD) verwenden Organisationen aus lohnintensiven Ländern zunehmend das Offshore-Outsourcing, um ihren Software-Entwicklungsbedarf abzudecken.

Software-Projekte scheitern immer wieder, trotz des Wissenszuwachs in den letzten Jahrzehnten. Bei Team-basierten Tätigkeiten, wie es Software-Projekte sind, liegt der Schlüssel zum Verständnis der Misserfolge in einer Untersuchung auf Team-Ebene. Wir haben 19 Projekte, die als OOSD-Misserfolge gelten, aus der Team-Perspektive heraus untersucht und haben dazu als Methode die Grounded Theory verwendet, um sowohl die Kunden- als auch die Anbieterseite zu analysieren. Als Primärquellen dieser Forschungsarbeit haben Projektleiter multinationaler Organisationen aus Indien und der Schweiz, die in OOSD-Projekte involviert waren, fungiert. Dieser explorative Forschungsansatz hat das Gewinnen von Erkenntnissen über OOSD-Projekt-Misserfolge ermöglicht, insbesondere von Indikatoren für Misserfolge, die sich bereits in frühen Projektphasen manifestieren.

Wir haben fehlgeschlagene OOSD-Projekte analysiert und haben uns dabei besonders auf die Team-Ebene fokussiert. Wir haben einzigartige Aspekte auf der Team-Ebene diagnostiziert und auf dieser Basis theoretische Annahmen formuliert, die die Integration der involvierten Teams (Kunden-Onshore-, Anbieter-Onshore- und Anbieter-Offshore-Team) zu einem einzigen Projekt-Team begünstigen. Unsere Forschungsergebnisse zeigen, dass ein gemeinsames Verständnis aller Team-Mitglieder über die

organisatorischen und beruflichen Kulturen der Onshore- und Offshore-Teams wichtig ist. Eine Haupterkenntnis war, dass die Integration der organisatorischen Arbeitspraktiken innerhalb des Projektteams von entscheidender Bedeutung ist, um Projektmisserfolge zu vermeiden.

Um die Dynamik von Projektteams in den frühen Projektphasen zu verstehen und um den Projektmanagern ein Prognose-Werkzeug zur Vermeidung von Misserfolgen in OOSD-Projekten bereitzustellen, wurden in dieser Arbeit frühe Warnindikatoren (early warning signs auf Englisch; abgekürzt EWS) für Misserfolge analysiert. Die EWS haben als Projektmanagement-Werkzeug die Identifikation von zukünftigen Problemen unterstützt. Wir haben sechs Kategorien von EWS für Misserfolge, die im Umfeld der OOSD-Projekte relevant sind, identifiziert. Während in der Literatur im Allgemeinen die Interaktion zwischen Kunden- und Anbieter-Teams betont wird, haben sich in unserer Arbeit die Interaktionen zwischen den Anbieter-Onshore-Teams und den Anbieter-Offshore-Teams als ebenso relevant für die Vermeidung von Projekt-Misserfolgen herausgestellt. Wir haben dann die EWS für Misserfolge in zwei Arten unterteilt: Die erste Art sind die Early Signals, die konkrete Hinweise darstellen, die für die Projektleiter wahrnehmbar sind. Die zweite Art sind die Early Warning Issues, die mit den Early Signals verbunden sind. Anschliessend haben wir ein exploratives Modell für OOSD-Projekt-Misserfolge entwickelt, welches die EWS für Misserfolge einbezieht, um den Prozess des Scheiterns, besonders in den frühen Projektphasen, zu verstehen.

Als Ergebnis unserer Analyse bezüglich der Wahrnehmung und dem Management von EWS für Misserfolge haben wir ein Modell mit vier Management-Phasen bezogen auf die Kunden und Anbieter erstellt. Die vier Phasen heissen: EWS überwachen, EWS erkennen, Probleme als solche (an-)erkennen und Probleme behandeln. Jede weitere Phase des EWS-Managements wurde als zunehmend schwieriger zu erreichen empfunden. Wir haben die Gründe identifiziert, warum das Managen der Probleme in jeder Phase scheiterte. Um zu verstehen, warum die EWS nicht erkannt und behandelt worden waren, hat sich das Fehlen adäquater Erfahrungen im Umfeld von Onshore-Offshore-Projekten als besonders bedeutend erwiesen.

Unsere explorative Forschung leistet einen Beitrag zur Literatur in den Bereichen von IS-Misserfolgen und IT-Outsourcing. Wir haben die Thematik von Projekt-Misserfolgen in der vorliegenden Arbeit behandelt, worüber es bis jetzt nur wenige empirische Studien gab. Zudem haben wir die Probleme und die verschiedenen Kontexte des Offshore-Outsourcing beleuchtet, die in vielen Organisationen auf verschiedenen Kontinenten zu Projekt-Misserfolgen führen. Dadurch haben wir Misserfolge im Offshore-Outsourcing besser verstanden.

Acknowledgments

As the research process comes to an end in the form of this dissertation, I wish to thank everyone who supported me throughout this long journey.

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To Erik: Thank you for your suggestions and the discussions we shared – I have really enjoyed the time we have spent together with Prof. Schwabe, writing papers and attending conferences. And thank you very much for proofreading this thesis.

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Since this research concerns a sensitive topic, project failures, I ensured anonymity to all the project managers who participated in this research. Though I cannot therefore thank them by name, I hereby offer my thanks to all of them collectively for offering insights on the factors that lead to failures in projects; without their input this research would not have been possible – as I well understood during all the sleepless nights I spent worrying over many declined requests for interviews. So to all those who took a chance and

agreed to share their knowledge with me: Thank you for your openness and your readiness to be part of my work.

I would hereby also like to thank all my teachers and lecturers, who laid the foundation that allowed me to write this thesis. Without each learning step in schools and universities, this work would definitely not have been possible.

Last but not least, I thank all my extended family members, especially my mother, my sister, my wife, and my little daughter for supporting and putting up with me during this research. And finally, I dedicate this thesis to my father, Yohannan Philip, who sadly did not live to see its completion.

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1. Introduction

1.1. Research context

Information technology (IT) outsourcing[1] has been prevalent since the 1960s, when organizations began to rely on external vendors for financial and operational computing (Lee et al. 2003). One of the landmark agreements in IT outsourcing history was signed in 1963, when EDS took over the data processing department of Blue Cross in Pennsylvania, USA (Dibbern et al. 2004). Although the quarter century that followed saw many organizations outsource their IT activities, it was not until Kodak signed its USD 1 billion deal with IBM, DEC and Businessland in 1989 that organizations truly realized the potential of concentrating on organizational core competencies and took a widespread interest in outsourcing (Prahalad and Hamel 1990; Hirschheim and Dibbern 2002). The global outsourcing business, which was worth USD 10 billion in 1989, had by 2010 reached a global market of USD 450 billion, out of which global IT outsourcing was worth USD 270 billion (Willcocks, Cullen and Craig 2010). IT outsourcing is expected to grow further in the near future, to the tune of 5-8 percent annually (Willcocks, Cullen and Craig 2010).

The globalization of the software industry has resulted in the growth of IT offshoring (Aspray, Mayadas and Vardi 2006). This trend of transferring IT activities from high-wage countries to low-wage countries like China and India has been promoted by cost arbitrage (Sahay, Nicholson and Krishna 2003; Dibbern, Winkler and Heinzl 2008), the availability of qualified workers (e.g., Heeks et al. 2001; Sarker and Sahay 2003), and the improved information and communication technology infrastructure (e.g., Walsham 2002; Hinds, Liu and Lyon 2011). Beulen, Ribbers and Roos (2006, p. 207) define IT offshoring as "the transfer of IT service delivery responsibility to a provider operating from a continent different from the recipient." There are two major forms of offshoring: captive offshoring and offshore outsourcing. Captive offshoring refers to the delivery of IT services by an in-house organization located in an offshore country like India, while offshore outsourcing refers to outsourcing from a third-party organization in an offshore

[1] Hirschheim and Dibbern (2006, p. 3) define outsourcing as "making arrangements with an external entity for the provision of goods and services to supplement or replace internal efforts."

country (Aspray, Mayadas and Vardi 2006). The latter form is associated with more risks since the client organizations are less able to exercise control over the project execution. Despite the inherent risks involved in IT offshoring (King and Torkzadeh 2008), offshore outsourcing has grown steadily: in 2010, the revenues surpassed USD 60 billion (Willcocks, Cullen and Craig 2010). IT offshore outsourcing is expected to grow faster than overall IT outsourcing, with some predictions expecting even double-digit growth in the near future (Willcocks, Cullen and Craig 2010). Notwithstanding the growth rates in IT offshoring, several studies have reported the failure of offshoring engagements to bring in the expected benefits for outsourcing organizations in terms of project objectives (e.g., Vashistha and Vashistha 2005; Rottman and Lacity 2008).

Several models of IT outsourcing have emerged over the years, and one can classify outsourcing according to different criteria, including the degree of outsourcing, the ownership structure, or location of services. The degree of IT outsourcing in organizations can range from total to selective to none (Dibbern et al. 2004). Services commonly outsourced include business process outsourcing, software development, and IT infrastructure (Wiener 2006). Oshri, Kotlarsky and Willcocks (2011) provide an overview of outsourcing models organized by ownership and location (figure 1). Ownership structures in IT outsourcing engagements can include third-party organizations, joint ventures between vendor and client, and in-house development or services of the client. As for location, outsourcing services can be located in the same country as the client (onshore), in a neighboring country (nearshore), or in a far-off country on a different continent (offshore).

Among commonly outsourced services, software or application development appears particularly ideal for global disaggregation because its key characteristics include e.g. high information intensity and low need for customer and physical presence (Apte and Mason 1995). In the software industry, geographically distributed software projects have even emerged as the norm (Damian and Moitra 2006). However, software development projects have been difficult to manage "even in conditions of co-location and proximity" (Sahay, Nicholson and Krishna 2003, p. 245). This is due to the inherent complexities in project management (Brooks 1995) and to uncertainties around the project from the

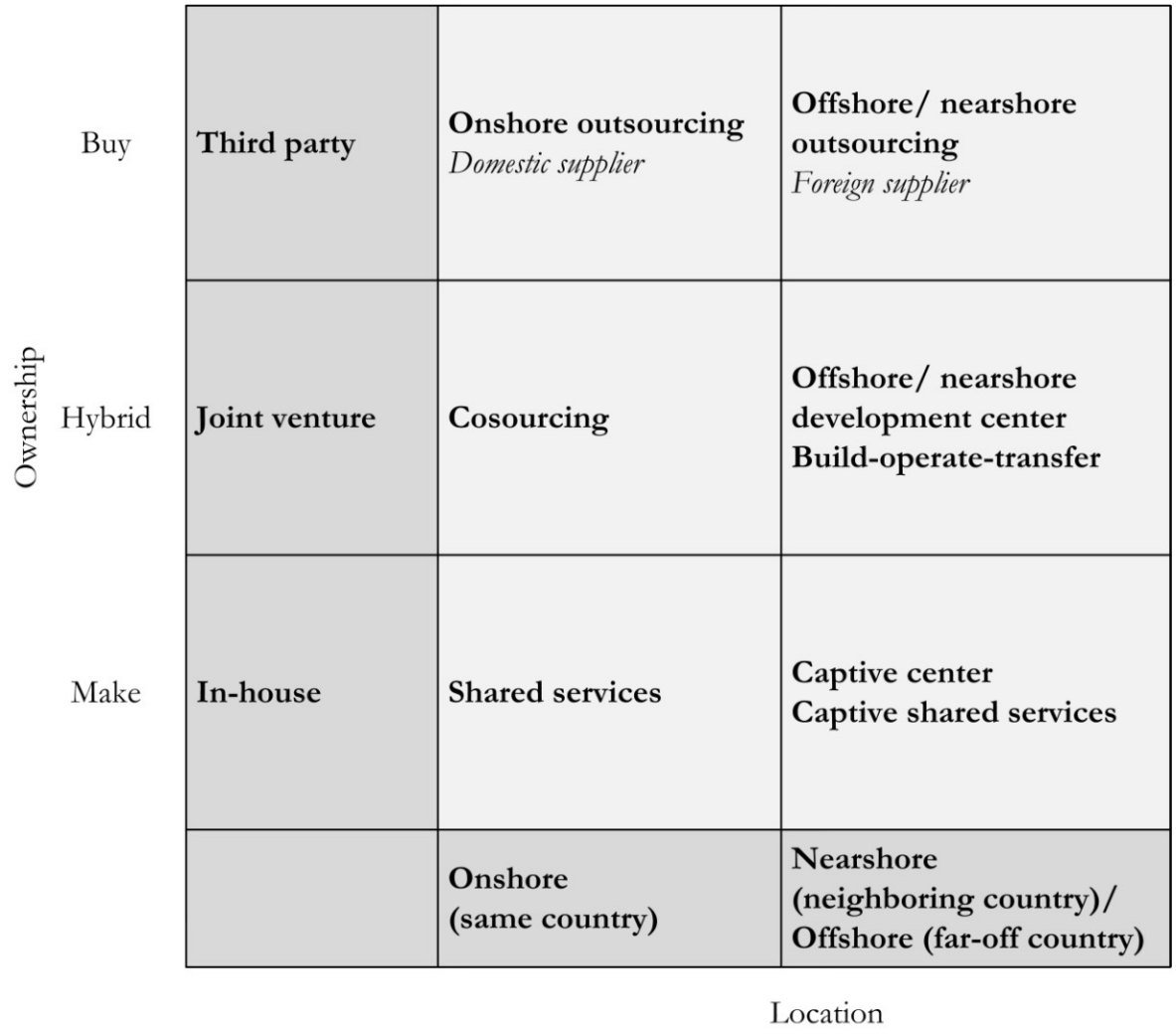

Figure 1: Overview of outsourcing models (adapted from Oshri, Kotlarsky and Willcocks 2011, p. 26)

outset (Hoch et al. 2000). Further, offshore outsourced software development (OOSD) projects are more prone to failure than domestically outsourced or in-house development projects (Iacovou and Nakatsu 2008). Widely cited offshore-specific risks that make OOSD projects more susceptible to failure include language differences (e.g., Dibbern, Winkler and Heinzl 2008), time-zone differences (e.g., Hinds, Liu and Lyon 2011), cultural differences (e.g., Krishna, Sahay and Walsham 2004), geographic distance (e.g., Carmel and Agarwal 2001), communication and coordination challenges (e.g., Heeks et al. 2001; Narayanaswamy and Henry 2005) and knowledge transfer complexities (e.g., Sahay, Nicholson and Krishna 2003). As a result of these inherent risks, managing OOSD projects requires additional governance (Beulen, Ribbers and Roos 2006); nevertheless, the cost savings from offshore projects make them attractive for organizations.

Despite the body of knowledge accumulated over the last decades, software projects continue to fail (Sauer 1993). In terms of failure criteria measured by original timeline, budget, and functionalities, most software projects can be termed failures rather than successes (Standish 1995; Standish 2004; McManus and Wood-Harper 2007). In addition, it seems that most project managers have experienced one or more failures, as was revealed in a study by RONIN, a high-tech research group (cited in Hoch et al. 2000, p. 161). That study interviewed 500 IT managers from the United States and United Kingdom, 76 percent of whom admitted to having experienced at least one complete project failure in their career and nearly 50 percent of whom remarked that it would be "alien" to most vendors to achieve success on the first try. There have been several academic studies on IT outsourcing failures resulting in project abandonments and contract cancellations (e.g., Oz 1994; Keil 1995; Keil, Mann and Rai 2000). Further examinations of failed offshore projects (failed in terms of failing to achieve objectives) include Aron and Singh (2005) and Rottman and Lacity (2008). There have also been several practitioner-oriented studies, in which offshoring was found to have failed to reduce IT costs (e.g., Hatch 2005; Vashistha and Vashistha 2005; Carter 2006). However, there have been few academic studies dealing with OOSD project cancellations.

The concept of failure itself has been defined in numerous ways (cf. section 2.1). In this thesis, we will concentrate on abandoned (Ewusi-Mensah and Przasnyski 1991) or impaired projects (Standish 1995), which count among the most extreme types of project failures. *Project failure* is defined as the cancellation of the project, resulting in termination of contractual activities between clients and vendors prematurely, i.e., before the information system becomes operational. This includes projects that were abandoned or insourced because of the vendor's inability to implement the information system. This thesis also defines as failures projects in which the vendor was replaced, the offshore activities were stopped, or the project was cancelled at any project phase.

Hinds, Liu and Lyon (2011, p. 138) view globally distributed teams as "serving as an important vehicle of global work." Our preliminary research into offshore project failures (Philip, Schwabe and Ewusi-Mensah 2009; Philip, Schwabe and Wende 2010) has

indicated that team-level collaboration between onshore and offshore teams from the client and vendor sides plays the primary role in the project outcome. Team-level communication and coordination have emerged as critical issues in avoiding project failures. Several authors have studied the dependence of team effectiveness on task, teamwork, and communication technologies (e.g., Maznevski and Chudoba 2000; Sakthivel 2007). However, there has been a dearth of studies examining team-level issues leading to project failures in IT outsourcing research.

In most project failures, "the seeds of failure sown earlier in the project … mature in the soil of ignorance" (Cule et al. 2000, p. 72). Post-mortem examination of failures has shown that there were significant early warning signs (EWS) of failure before the projects actually failed (Kappelman, McKeeman and Zhang 2006). Examining the collaboration between the vendor and client teams in the early project stages can provide the cues that indicate that the project is headed for failure. Although project troubles are rarely detected early enough in the IT industry (Havelka and Rajkumar 2006), project managers are mostly in a position to identify troubling issues during project execution (Keil et al. 1998).

Detecting potential issues during the first 20 percent of the project's vendor-client collaboration phase would allow project managers to take appropriate corrective measures early enough to complete the project according to original estimates (Kappelman, McKeeman and Zhang 2006). These execution measures are analogous to the medical field. Doctors regard patient symptoms like chest pain and numbness in the left arm as classical symptoms prior to a heart attack (Ward 2003) – yet these symptoms might be late warning signs, as effective treatment requires the identification of early signs such as high blood pressure or high cholesterol levels (Ward 2003).

Another good practical example of early warning signs is the deployment of the tsunami early warning system in the Indian Ocean that apprises of an impending tsunami resulting from underwater earthquakes (Sobolev et al. 2007; Rudloff et al. 2009). This system was developed after the horrific undersea earthquake in December 2004. The challenge in finding early warning signs includes eliminating false positives. In the case of the tsunami

early warning system, for instance, the difficulty of distinguishing whether an earthquake involves horizontal or vertical movement of the tectonic plates has posed problems for the system: the former is much more likely than the latter to cause a tsunami, but as detecting the direction of movement is less than precise, the system has issued several false alarms like the ones given in several Asian countries in April 2012 (Padma, Daniel and Yamin 2012). In this study, however, rather than providing causal explanations of the event – in the tsunami case, the direction of the earth plate movement – we intend to focus on predicting particular scenarios (cf. section 3.4). Information that helps project managers predict future project states allows them to initiate necessary measures to avoid disasters. We also work to guard against the false positives that could result from too-hasty conclusions.

Offshore projects, too, experience early warning signs – for example, a lack of readiness on the part of vendor offshore team members to question the onshore team regarding problems (Philip, Schwabe and Wende 2010). This lack of questioning results from organizational and national cultures that shape work practices. Indian cultural conventions discourage open expression in front of superiors and questioning the requirements of clients. Indian team members' silence could, however, be interpreted by the client team as an indication that project tasks are moving in a smooth manner. In the preliminary quantitative study in which we established the relevance of team-level analysis (Philip, Schwabe and Wende 2010), we also uncovered several other communication-related EWSs. However, only a deeper analysis of team-level issues can reveal how issues develop during project execution and how project managers can identify them. Understanding EWSs of failure better will allow more effective execution of OOSD projects.

Since vendors might not work together with the client at the time when the project is initiated in the client organization, we have adopted the following pragmatic definition of EWSs in this thesis. We define *early warning signs* as a project state or indication that surfaces in the first 20 percent of the project's cooperation or collaboration period between clients and vendors, and that warns one about possible or impending problems or issues (based on Kappelman, McKeeman and Zhang 2006).

1.2. Research relevance and questions

This thesis aims to study the phenomenon of OOSD project failure and to provide project managers in offshore projects with tools to help them recognize situations that may be heading toward failure by detecting EWSs of failure. By studying the perception and management of EWSs of failure from the project managers' perspective, we aim to obtain a better theoretical and managerial understanding of failures, with particular attention to indications and states of failure appearing in the early project stages. OOSD projects involve resources from onshore and offshore project teams and the project circumstances that lead to failure are not well understood. This could explain recurring project failures in many organizations. The insights gained from this research offer academics and practitioners a better understanding of offshore IT project performance by contributing both theoretical accounts of OOSD project failures and practical guidelines for addressing them. Further, the originally planned benefits (Ward and Daniel 2006) of the offshore project such as cost savings, quicker time-to-market, etc., can be realized by recognizing and managing issues emerging from the project early enough.

As the proliferation of studies testifies, academic interest in the phenomenon of IT outsourcing has grown substantially since the 1990s (Dibbern et al. 2004). A review of the IT outsourcing and IT offshoring literature shows that most studies have focused on the IT outsourcing engagement level, especially on decision processes and the management of IT outsourcing operations, rather than on the IT project level (Dibbern et al. 2004; Gonzalez, Gasco and Llopis 2006; Lacity et al. 2010; Wiener, Vogel and Amberg 2010). This has resulted in a dearth of research on the team-level dynamics that cause project failures. Further, there has been scant research on failures in IT outsourcing projects (Sparrow 2003) and software development projects (Ewusi-Mensah 2003). Although the IT offshoring research domain has received more attention since the 2000s (Lacity et al. 2010), few in-depth studies address the management of offshored projects (King and Torkzadeh 2008). This gap in research regarding failures in OOSD projects prompted us to contribute to information systems (IS) failure research and help project managers achieve the planned business benefits from offshore outsourcing.

One major reason behind the lack of research into IT outsourcing failures is the sensitivity of failures for both the clients and vendors. As Sparrow (2003, p. 195) notes, this makes it difficult to research outsourcing relationships: "Few organizations are willing to talk openly about costly mistakes, unwise contracts or failed relationships. There is the added commercial sensitivity of the outsourcing relationship. The customer organization will not want to aggravate the position by open discussion of the supplier's flaws and both customer and supplier will have a vested interest in keeping the matter private."

Similarly, IT offshoring research stream, which forms a sub-stream in the IT outsourcing research area, has few insights to offer regarding the peculiarities of OOSD project failures. The fear of backlash from the public in the outsourcing countries is an additional reason that makes clients reluctant to openly discuss offshoring in public. Failures in offshoring are even more sensitive than failures in domestic outsourcing and, therefore, publicizing the failure can lead to a loss of reputation for both clients and vendors. Because the risks involved in offshore software development are higher, the provider's reputation and the client's trust in the provider's ability to deliver are vital to positive outcomes (Hoch et al. 2000). Since service providers engage in one-on-one relationships with clients to implement software solutions, and since word-of-mouth reference is the primary source of marketing for most service providers, the providers are exposed to higher risks when a failure is publicized. In fact, although failures are common in the IT industry, specialists in the industry seem to adhere to a code of silence regarding them (Ewusi-Mensah 2003). While there are many unsuccessful IS projects in organizations, only major disasters receive public attention (Flowers 1996).

Glass (1997, p. 16) asserts that failures could provide a "much more indelible lesson to be learned" than successes. Ackoff (1994, p. 3) puts the matter more concretely: "When one does something right, one only confirms what is already known: how to do it. A mistake is an indicator of a gap in one's knowledge. Learning takes place when a mistake is identified, its producers are identified, and it is corrected." Unfortunately, the software industry has failed to learn lessons from failures (Glass 1998). There are several barriers that keep organizations from conducting post-mortem examinations. Kasi et al.'s (2008) Delphi survey found that some of the main barriers include getting lost in current

business, lack of a culture of inter-project learning, and lack of mechanisms to encourage exploitation of the lessons of previous experiences.

The lack of organizational willingness to admit failures and the difficulties that researchers face in trying to access the relevant data result in less research into the causes of failure (Ewusi-Mensah 2003). The tight-lipped approach of organizations to failures cripples the dissemination of knowledge about the issues surrounding failures and leads to a "cycle of failure" (Flowers 1996, p.2). Lyytinen and Hirschheim's (1987, p. 301) failure studies found "little direct reward" for research in practice as projects continue to fail despite the body of knowledge accumulated.

Although several studies in the past (e.g., Lucas 1975; Lyytinen and Hirschheim 1987; Sauer 1993; Fortune and Peters 2005) have shed light on IS failures from the usage and operation perspectives, failed software development projects have received little attention from researchers (Ewusi-Mensah 2003). Ewusi-Mensah and Przasnyski (1991, p. 83) note in their seminal work in the area of IS project abandonments that "IS project abandonment is indeed a complex, multidimensional issue that defies simple explanations." In a survey of Fortune 500 companies in the United States, Ewusi-Mensah and Przasnyski (1994) found that 60% respondents abandoned more than one project due to more or less the same reason, while 70% answered that no records of abandoned projects were kept in the companies, which increases the likelihood of same failures repeating in organizations. As Abdel-Hamid and Madnick (1990, p. 39) point out, the above survey demonstrates that the "failure to learn from mistakes has been a major obstacle to improving software project management." Furthermore, Lyytinen and Robey (1999) note that organizations fail to learn from their own experiences because of barriers that include limits on organizational intelligence, disincentives for learning, organizational design, and educational barriers.

The particular challenges involved in OOSD projects are discussed extensively in the IT offshoring literature (e.g., Lacity et al. 2010; Wiener, Vogel and Amberg 2010). The existing research indicates that OOSD projects, with their inherent risks, are more prone to failure than captive offshore or domestic development projects (Iacovou and Nakatsu 2008). Offshore-specific factors like cultural and language differences, knowledge transfer

issues, and geographical separation make team management challenging (Sahay, Nicholson and Krishna 2003; Oshri, Kotlarsky and Willcocks 2009; Philip, Schwabe and Ewusi-Mensah 2009). Researchers have found that several aspects, such as communication, coordination, and collaboration mechanisms, are necessary for the successful conduct of OOSD projects (e.g., Cramton 2001; Hinds, Liu and Lyon 2011; Sidhu and Volberda 2011).

Despite such research, we still lack an in-depth study of an offshore project context that addresses failure-predicting circumstances. The insights from such an exploratory study would help us better understand the occurrence of EWSs of failure and situations in which failure is a likely outcome. Though IT offshoring research has illuminated several reasons behind the lack of success in offshore outsourced projects (cf. section 2.3), the unique aspects of OOSD projects that prompt failures have not been studied extensively. This raises unanswered questions regarding the extent to which team-level interaction or the lack of its intensity influences the failure rate of projects. Further, the lack of research in the IS failure research stream regarding offshore projects indicates that detailed and concrete attention to circumstances that predict failures and to team-level interaction in OOSD projects is called for.

By investigating the team-level issues, IS researchers as well as practitioners involved in OOSD projects would gain the following benefits. Firstly, information regarding the unique issues related to the project team in OOSD projects and regarding the team member (non)interactions that predict project failures can offer insights into overlooked team dynamics and thus help project managers avoid failure by taking action in the early stages of OOSD projects. Secondly, IS failure research would gain from the exploratory research in offshore projects by closing the gap between theory and practice in understanding failures (Yeo 2002). Similarly, as McManus and Wood-Harper (2007, p. 43) note, "[a]lthough our understanding of the importance of project failure has increased, the underlying reasons still remain an issue and a point of contention for both practitioners and academics alike." We intend to reduce the research gap between theory and practice by delineating the specific aspects at the team level that predict project failures and by accounting for these failures theoretically. We therefore formulate the first research question (RQ) as follows:

RQ 1: *Which unique team-level aspects of offshore-outsourced software development projects predict failures and how do they predict failures?*

Besides identifying OOSD-specific aspects related to failures, we also want to understand the role that early warnings play in reducing the failure rate (Kappelman, McKeeman and Zhang 2006) of OOSD projects. Our preliminary quantitative study regarding the EWSs of failure in OOSD projects confirmed the existence of EWSs in the offshore context (Philip, Schwabe and Wende 2010). This research, which was done using a Delphi survey, was not specific to offshore outsourcing, but also included captive offshoring. The survey found that communication and coordination factors were the highest-ranked offshore-specific EWSs. Our aim now is to deepen and extend the insights from that preliminary study and to provide a foundation for using EWSs of failure to design corrective management solutions that can put the troubled projects back on track.

Reviewing the literature on the topic of EWSs (cf. section 2.4) reveals several unanswered questions that hamper our understanding of the concept of EWSs of failures from a global team perspective (Nikander and Eloranta 2001; Havelka, Rajkumar and Serve 2004; Kappelman, McKeeman and Zhang 2006). Klakegg et al. (2010) calls for industry/project-specific studies to understand the nature of EWSs in each industry/project type. Analysis of the EWSs from various industries shows that there is far less work than is needed on EWSs of failures in offshore-outsourced software projects. A better understanding of OOSD project-related EWSs of failure would benefit project managers by helping them execute the project as originally envisioned. Further, the IT offshoring literature reveals a lack of deep research on the interactions between onshore and offshore teams in the early project stages, which could help illuminate EWSs from the global team perspective. In-depth research into the dynamics involved in the collaboration of team members in the early project stages (Fabriek et al. 2008) is missing, precluding a clear understanding of the deeper effects of the team issues and the EWSs of failure. Finally, empirical studies have not addressed the EWSs concerning the early OOSD project stages from the perspective of project managers, who are closer to the project than other stakeholders, and whose experiences are vital to gaining a deep understanding of how EWSs of failure are perceived. We lay the exploratory foundations of such work by analyzing the EWSs of failure related to the project team deeply and

studying the manner in which they are noticed by project managers. By analyzing these warning signs, our study will aid the project managers in OOSD projects to institutionalize an early warning mechanism to act upon (Keil and Montealegre 2000). We therefore formulate the second research question as follows:

RQ 2: *What are the early warning signs specific to offshore-outsourced software development project failures that are related to the project team and how can the project managers perceive them?*

A better understanding of EWSs of failure – whose existence has been confirmed by several empirical works (Nikander and Eloranta 2001; Havelka, Rajkumar and Serve 2004; Kappelman, McKeeman and Zhang 2006) – and their relation to the project team is in itself valuable, but it is not sufficient. Several questions regarding the failure to manage EWSs in offshore projects remain open. The scantiness of the research on how EWSs are managed (Nikander and Eloranta 2001; Williams et al. 2012) prompted us to address how project managers notice the presence of the EWSs of failure, particularly in OOSD projects. Our research provides an in-depth analysis of the perception and management of the EWSs of failure by focusing on inefficiencies in managing EWSs at the team level in the OOSD project context.

Further, even when the issues that lead to failure are detected in the early stages, they may not always be acted upon (Williams et al. 2012). This prompted us to study why the EWSs of failure that are noticed are not managed before the problems causing the failure become so exacerbated that they lead uncontrollably to project failure. Little research exists concerning the reasons why project managers fail to notice EWSs, and the extent to which project managers could control issues that lead to project failures demands more analysis. The reasons why project managers do not act upon EWSs of failure need to be understood. These insights will enable project managers to be more proactive regarding issue resolution and complete the project according to the original estimates. The present exploratory research lays the foundation for illuminating the reasons behind the inability of project managers to manage the EWSs in failed OOSD projects. A better understanding of these reasons would allow managers to adapt better to the onshore-offshore project context. The third RQ is therefore formulated as follows:

RQ 3: *How are the team-level early warning signs of failure managed by project managers in offshore-outsourced software development projects? Why are they not managed effectively?*

1.3. Contributions

Our study is one of the few to analyze failed project cases in the offshore-outsourced context. This thesis makes three main academic contributions to the literature on IS failure and IS outsourcing. Firstly, we identify and characterize the EWSs of failure in OOSD projects at the team level, distinguishing them into easily noticeable early signals and their early warning issues. Secondly, we develop an exploratory model of OOSD project failure that incorporates the concept of EWSs. This model can aid project managers in understanding the early failure process and to monitor and assess risk right from the start of the project. Thirdly, we develop a four-stage model for the management of EWSs and identify the complexities involved in managing EWSs during the project. This model can be applied to examining the inability of vendors and clients to detect and manage issues in OOSD projects.

1.4. Thesis structure

This chapter has introduced the key concepts of this thesis and our overall research endeavor; an overview of the thesis structure is depicted in figure 2. Next, we turn to a review of the literature that served as the background to our exploratory research and that represents the extant knowledge on the topic at hand (chapter 2). After that, we describe the qualitative research design adopted to answer our research questions as well as the research path followed in this research (chapter 3).

The subsequent three chapters set out the results of our empirical research and answer the research questions formulated in this chapter. First, we discuss the unique aspects that predict failures in OOSD projects during the project execution in the light of team cooperation at onshore and offshore locations (chapter 4). We outline the theoretical propositions we have developed that indicate the circumstances for reducing the likelihood of failures in the onshore-offshore project context. Next, we identify and discuss the EWSs of failure and put them into the context of OOSD project failures (chapter 5). We then turn to the perception of EWSs during the failed projects, together

with the inability of project managers to manage them appropriately in a timely manner (chapter 6). A summary and synthesis of the key findings from the empirical chapters concludes this thesis (chapter 7). The final chapter also outlines the limitations of this study and its implications for research and practice, and considers potential future research directions.

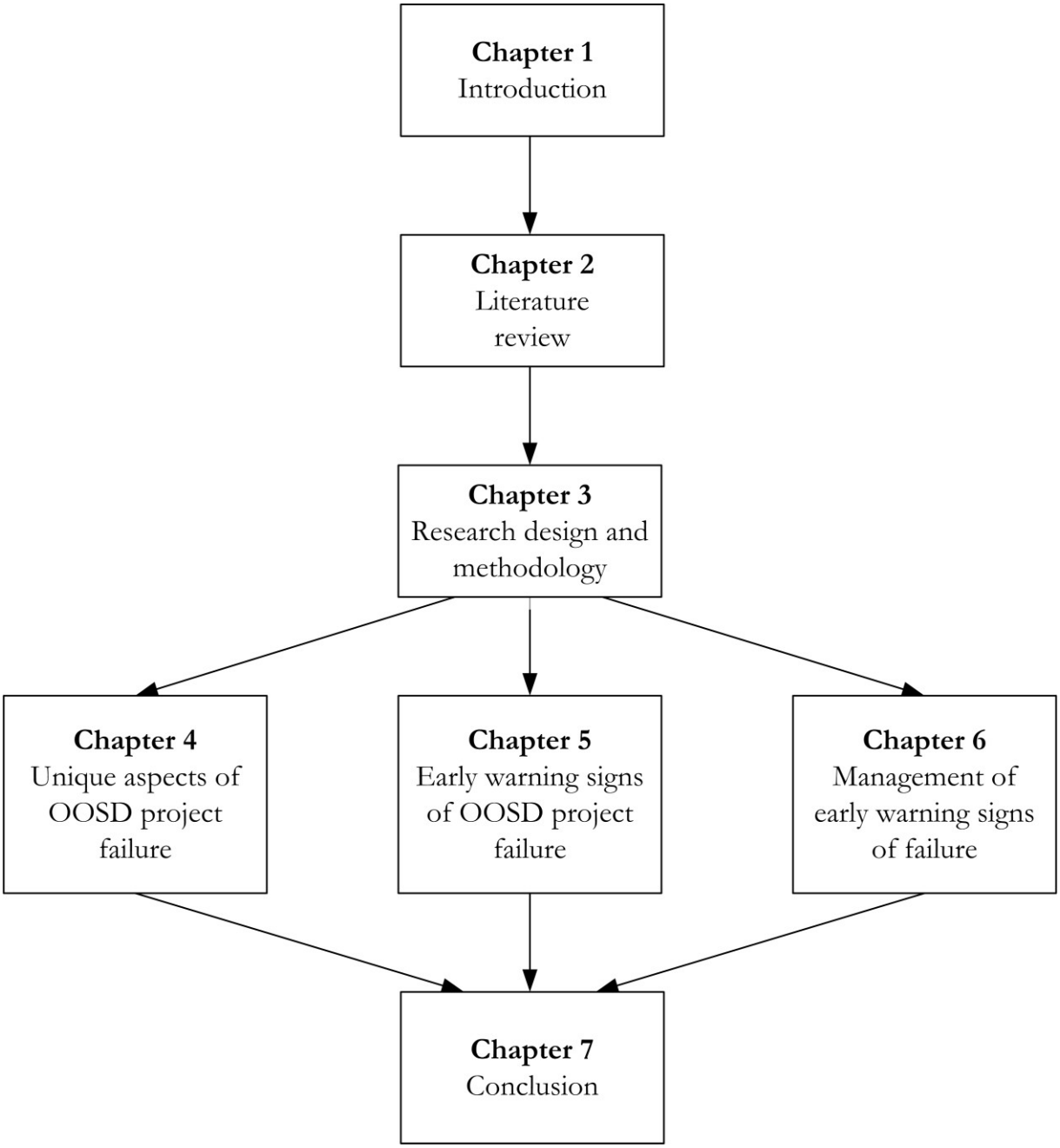

Figure 2: Thesis structure

2. Literature review

In this chapter, we survey the literature relevant to understanding the early project stages of the offshore outsourced project context. The context in which projects are executed influences the ability of project managers to understand EWSs of failure (Klakegg et al. 2010). Therefore, reviewing the research on the project context, formed by project failures, software project team characteristics, and the offshore-outsourced software environment allows us to understand the EWSs of failure better, even if this is an area with limited research literature. The IS literature by academics and practitioners in the areas of IT outsourcing, IS implementation, IS failures, IT project management and risk management provides the basis for answering the research questions we formulated in chapter 1. Since little work has been undertaken in the area of OOSD project failures specifically, the literature primarily provides the background to the research context. The general topics discussed below include IS project failures, software projects and teams, IT offshoring, and early warning signs. Finally, we summarize the topics discussed in order to understand the extent to which the existing literature has answered the research questions and to identify further research gaps.

2.1. IS project failures

There is a lack of consensus among researchers regarding how to define project failure (Pinto and Mantel 1990). Lyytinen and Hirschheim (1987) regard the notion of IS failure as "nebulous and ill-defined" (p. 258) and define IS failure as the "inability of an IS to meet a specific stakeholder group's expectations" (p. 263), which is among the narrowest failure definitions, since it encompasses the expectations of each stakeholder. Following the above definition, a project could be declared a failure if the expectations of a stakeholder group are not fulfilled. Sauer (1993) notes the problematic nature of Lyytinen and Hirschheim's (1987) definition, pointing to the different capabilities of stakeholders, their ignorance of each others' intentions, and their unequally reasonable expectations. Further, Flowers (1996, p. 4) defines an IS as a failure "if, on implementation, [IS] does not perform as originally intended or if it is so user-hostile that is rejected by users and is under-utilized." Among the more generous views, McManus and Wood-Harper (2007, p. 39) maintain that failure is "an absolute error that could not be recovered from."

Ewusi-Mensah and Przasnyski (1991, p. 69) analyze abandonment of IS projects and define the following three failure categories:

- Total abandonment – the complete termination of all activity on the project prior to full implementation
- Substantial abandonment – a major truncation or simplification of the project to make it radically different from the original specification prior to full implementation
- Partial abandonment – the reduction of the original scope of the project, without entailing major or significant changes to the project's original specifications, prior to full implementation.

One reasonably clear definition of failure comes from the Standish Group's (1995) CHAOS report, which has long been published at regular intervals and which is among the failure reports most cited by practitioners and academics. Although the practitioner-oriented CHAOS report remains controversial among academics, it provides useful definitions of project performance by clearly differentiating between success and failures (challenged and impaired, p. 2):

- Project success: The project is completed on-time and on-budget, with all features and functions as initially specified
- Project challenged: The project is completed and operational but exceeds the budget, exceeds the time estimate, and offers fewer features and functions than originally specified
- Project impaired: The project is cancelled at some point during the development cycle

Another categorization of at least partial failure comes from the consulting firm KPMG: software development failures that appeared as *software runaways*. A software runaway is defined as a project "which has failed significantly to achieve its objectives and/or which has exceeded its original budget by at least 30%" (Cole 1995, p. 3). Glass (1998, p. 3) adds causation to the above definition, describing a runaway project as "a project that goes out

of control primarily because of the difficulty of building the software needed by the system." Glass' (1998) runaway projects, by definition, are 100% over budget compared to KPMG's 30% threshold and failure to meet the original targets.

Boddie (1986) discusses challenging projects that are always under *crunch mode*: the schedules are squeezed by half in order to achieve business objectives. Similarly, Yourdon (2003, p. 3) defines a *death march* project as "one which for which an unbiased, objective risk assessment (which includes an assessment of technical risks, personnel risks, legal risks, political risks, etc.) determines that the likelihood of failure is >= 50 percent." Such projects will have schedules compressed to less than the half the required timeline, staff reduced to less than half, budget reduced to half, and requirements that are double compared to a normal project environment.

Smith (2001) summarizes the characteristics of troubled project types described by Boddie (1986), Yourdon (2003), and Glass (1998) as a ratio of the projected cost to complete to the original budget cost (figure 3). The troubled projects included 'crunch mode,' 'death march,' and 'runaway' projects. For Smith (2001, p. 8), a troubled project has one or more of the following characteristics:

1. It exceeds the planned timescale by more than 50 per cent, excluding the timescale impact of agreed changes in scope
2. It exceeds the build cost by more than 35 per cent, excluding the cost of agreed changes in scope
3. It is the cause of major buyer dissatisfaction to the extent that the future of the project is called into question
4. The buyer lacks the commitment to make the project succeed
5. It substantially fails to support the intended business processes
6. It substantially fails to deliver the anticipated benefits
7. The outcome for buyer-vendor is not win-win

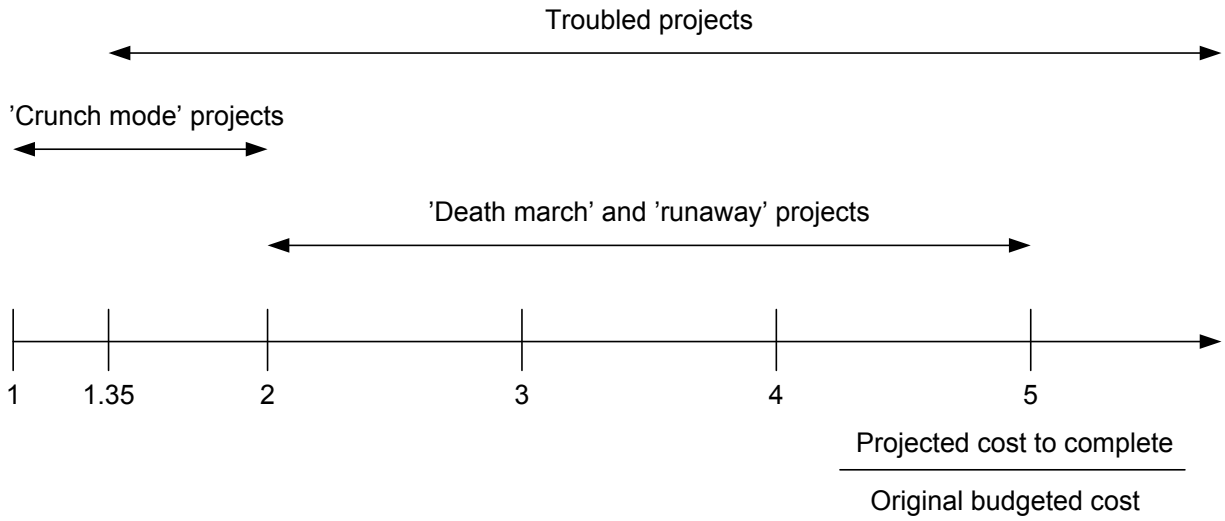

Figure 3: A taxonomy of challenged projects (Smith 2001, p. 4)

McManus and Wood-Harper (2007, p. 39) assert that "a predominant paradigm in IS project management is to view the development and delivery process as a three way trade-off between time (business urgency), cost (budget) and quality (product functionality or capability)." However, Atkinson (1999) argues that among the three success criteria used for measuring the success of IT project management, cost and time are at best only guesses that were calculated when uncertainty was high. The third criterion, quality, is a phenomenon that changes over the life cycle of the project. Nevertheless, Ewusi-Mensah (2003, p. 8) regards the inaccuracy or indefensibility of the cost and time estimates as irrelevant since "the inability of the project team to achieve the targeted goals makes the project development effort a failure."

According to Wateridge (1995), projects that were perceived to have failed have time and cost as the defined success criteria, while successful projects do not appear to regard time and cost as critical. Different stakeholders also have different views about the success of a project, and thus IS success and its criteria to some extent always remain a matter of definition (DeLone and McLean 1992). Agarwal and Rathod (2006) note that failure criteria are even more ambiguous than success criteria, and while the external stakeholders of a project use time and cost as success criteria, the stakeholders internal to the project from the provider's side consider the attainment of scope as the main success

criterion. Linberg (1999) noted that even though a system cost 417% above the budget and came 193% behind the planned schedule, the IS professionals considered the project a success because it was innovative and led to the acquisition of knowledge.

Apart from the three process-related failure criteria based on time, cost, and product applied by many authors, Nelson (2005) offers three further dimensions for judging the project outcome based on past, present, and future perceptions: use, learning, and value from the project. Based on these three criteria, projects can be termed failures if outcome-related criteria are not fulfilled, even though the process-related criteria are fulfilled (successful failures). On the other hand, it is also possible that the process-related criteria were not fulfilled for a project, but that project may nevertheless be termed a success within the organization (failed successes).

Ewusi-Mensah and Przasnyski (1994) viewed the abandonment of projects in a positive light, since abandonment prevents further expenditure of resources on projects that may never become successful, and since it offers organizations an opportunity (although an expensive one) to learn from past mistakes. Boehm (2000, p. 96) maintains that project termination cannot be interpreted as project failure as infeasible projects should be identified and terminated early enough. Boehm also puts the project risks and terminations into perspective: "It can take some adjustment to realize that terminating projects can be natural and even healthy. If you don't try some risky projects, you'll lose your competitive edge. But you shouldn't expect all your risky projects to succeed." Early recognition of project risks developing into project issues and eventually leading to project termination was found to be the key to prudent use of project resources within organizations.

Most researchers examining IS failures judge failures from either the project development or the integration and operations perspective. Studies taking the project development perspective address projects that failed to complete the software development process because of the project team's failure to deliver a functioning information system. On the other hand, studies from the integration and operations perspective concern projects that are completed in terms of software development processes, but failed in terms of project

outcome (Nelson 2005). They consider issues related to integration into existing application landscape, usage, and operations of the information system – issues that appear after the development phase. Below, we discuss the major works in the above two categories.

2.1.1. The software development project perspective

Integration and operations analysis of information systems formed the focus of the seminal work by Lucas (1975, p. 4), but Lucas also acknowledged the particular difficulties involved in managing software projects, stating: "[Project] management must coordinate users, the computer staff, and … consultants and must manage the development of a system. Specifications must be developed and met on time and within the original cost estimates. This management task has proved to be very difficult and the attainment of original goals elusive." This failure to complete the software development phase of outsourcing projects and the resulting project abandonments have since been studied by several authors.

The seminal work by Ewusi-Mensah and Przasnyski (1991; 1994) in the area of IS project abandonments argues that abandonments require complex and multidimensional explanations. Their surveys among top IS executives at Fortune 500 companies tested organizational, economic and technological issues based on the IS literature and found that organizational issues were the dominant factors leading to abandonment of projects. Similarly, Glaser's (2005, p. 82) practitioner-oriented work emphasizes the role of management in project failures and attributes failures to "the result of the actions and inactions of senior leadership."

Ewusi-Mensah's (2003, p. 9) analysis of software development failures, based on a review of the literature and the major empirical works, concludes that failures are "multifaceted and multidimensional," and any single contributing factor can cause the project to fail. Further, he notes that software project abandonment can result from a "multiplicity of cofactors" (p. 47) – among others, technical, organizational, political, managerial, sociological, and economic factors. He identifies 9 factors critical to the abandonment of software projects; these factors fall into 3 categories, namely, socio-organizational, socio-

technical, and economic. Inappropriate project-team composition was noted as one of the important factors that lead to project abandonments. On the other hand, McManus and Wood-Harper (2007), in their study on IT project failures, report that management, technical and business reasons were responsible for 53%, 27%, and 20%, respectively, of the 51 (out of 214) project cancellations across Europe that were analyzed during the period 1998-2005. The failure factors identified by them highlighted the difficulties in project and process management involving the client and vendor teams.

KPMG's (Cole 1995) surveys in the United Kingdom regarding runaway projects found that technology was a major factor (45% respondents) that led to runaway projects in 1994. Only 7% of respondents in 1989 considered technology a cause of runaway projects. Other causes of runaway projects found in the 1994 survey included project objectives not fully specified, bad planning and estimating, inadequate/no project management methodology, insufficient senior staff on the team and poor performance by suppliers. Other authors (e.g., Standish 1995; Ewusi-Mensah 2003) mention technical[2] aspects as opposed to the technological aspects referred to by Cole (1995). Technology as a cause leading to failures is less pronounced in most works than it is in Cole (1995).

Process and people alignment issues formed the major reasons behind the project cancellations reported by the Standish Group's (1995) CHAOS report. Boehm (2000), in his attempt to explain the issues leading to project failures reported by the Standish Group (1995), maintains that not all reasons can be traced back to poor management and that cancellations can be "natural and even healthy" as the business evolves (Boehm 2000). The Standish Group's (2009) report also points to process and people related issues, and the authors note project management expertise and execution as major factors affecting failures; these factors are relevant to offshore projects as well.

[2] Ewusi-Mensah (2003) defines the terms *technical* and *technological* as follows: *technical* is "the general level of expertise and depth of experience in computer hardware and software, and in the ability of the design team to appropriately use those resources to achieve the design objectives of the project" and *technological* is "the available computer hardware, telecommunications and networking facilities/infrastructure, software tools, and software development methodologies in the organization on which the project development is critically dependent" (pp. 107-108).

2.1.2. The integration and operations perspective

The seminal empirical work by Lucas' (1975) found that organizations tend to "overlook organizational behavior problems and users" (p. 2) and concentrate on technical aspects. Lucas' work remains relevant as organizational and technical issues are still among the major factors that lead to project failures (Ewusi-Mensah 2003; McManus and Wood-Harper 2007). Further, Cannon's (1994) analysis of two failed cases reports that failure was caused by the interaction of technical and organizational factors.

Flowers' (1996) study of some of the prominent failed IS project cases such as the online membership system of the Performing Right Society, the Confirm computerized reservation system, the London Ambulance Service computerized dispatch system, and the London Stock Exchange TAURUS found critical failure factors[3] under three categories that led to failures: organizational context, management of project, and conduct of the project. Technological, social and process related issues formed the majority of the characteristics that predicted failure. However, the factors he identifies are limited by the cases analyzed.

Further, Yeo (2002) conducted a Singapore-based survey in 2000, in which 92 respondents (Yeo does not specify whether they were clients, vendors, or both) rated the failure factors based on their experience on one IS project that was 'challenged' or 'impaired' as defined by the Standish Group (1995). The study categorizes 10 issues of influence under 3 spheres of influence. The 3 spheres of influence are process-, context- and content driven issues. The 10 issues of influence include business planning, project planning, project management and control (process driven issues), corporate culture, corporate management, users, politics (context driven issues), information technology, business process and system design, and IT/IS professional and knowledge sources (content driven issues). This survey noted that the managers dealt with team problems in projects reactively rather than in a proactive manner.

[3] Flowers (1996, p. 157) defines critical failure factors (CFF) as "the crucial elements of a project that, when they are in a less than optimal state, will increase the chance that an IS project will either fail or at worst, become a disaster."

From a practitioner-oriented perspective on failures, Vashistha and Vashistha (2005) claim that 50 percent of offshore engagements can be considered failures since they do not reduce costs or improve quality. In other words, they do not achieve the intended benefits (Ward and Daniel 2006). They discuss the management competencies and the challenges that need to be addressed to manage projects successfully, including factors related to performance, relationships, contracts, finances and resources. This work attributes offshore project failures to improper management, which is consistent with other empirical studies concerning completed software development project.

Since our research focus is on analyzing the failures during the software development phase of offshore outsourced projects, we adopted the software development project perspective for this thesis. Contracts have become the primary form of control in IT outsourcing engagements (Kern and Willcocks 2000; Gopal et al. 2003). According to Kern and Willcocks (2000), contracts build the foundation and regulate the engagement in outsourcing ventures. Therefore, we consider the fulfillment of contractual obligations as the basis of OOSD project failure. As already defined in chapter 1, we define *OOSD project failure* as the cancellation of the project resulting in premature termination of contractual activities between clients and vendors before the information system becomes operational. This definition of offshore project failure corresponds to the concept of "total abandonment" in failure research (Ewusi-Mensah and Przasnyski 1991) as well as to the concept of "impaired" projects (Standish 1995). Compared to process and outcome-based criteria used to judge project failures, this definition could be viewed as an extreme form of failure in software projects. Though offshore development project failures can result from external or internal issues that affect the project team in OOSD projects, this study concentrates on issues that are internal to OOSD projects and that project managers thus could notice and rectify during the project. The next section takes up the software project and team characteristics that affect OOSD projects.

2.2. Software projects and teams

McGrath (1984, p. 7) define groups as "social aggregates that involve mutual awareness and potential mutual interaction." Teams can be viewed as a form of groups (McGrath 1984), which Faraj and Sproull (2000, p. 1554) defined as "a primary mechanism for accomplishing organizational work." Cohen and Bailey (1997, p. 241) define team as "a collection of individuals who are interdependent in their tasks, who share responsibility for outcomes, who see themselves and who are seen by others as an intact social entity embedded in one or more large social systems (for example, business unit or the corporation) and who manage their relationships across organizational boundaries." They identify four types of teams, namely, work teams, parallel teams, project teams and management teams. In this thesis, we concentrate on project teams put together for the purpose of software development; such teams are defined by Cohen and Bailey (1997, p. 242) as time-limited teams that deliver one-time outputs and for the most part have tasks that "are non-repetitive in nature and involve considerable application of knowledge, judgment, and expertise."

Other taxonomies of project teams offer additional characteristics that apply to offshore project teams: they are, for example, global, dispersed, and virtual. Jarvenappa and Leidner (1998, p. 792) define a global virtual team as "a temporary, culturally diverse, geographically dispersed, electronically communicating work group." According to Martins, Gilson, and Maynard (2004, p. 808), virtual teams are "teams whose members use technology to varying degrees in working across locational, temporal, and relational boundaries to accomplish an interdependent task." Kahai, Carroll and Jestice (2007, p. 62) find that virtual teams could be further categorized "in terms of their tasks, the diversity among members, the level of shared understanding among members, how well the team members know each other, and how the team members and interactions are being led." MacDuffie (2007), studying distributed work practices, notes that virtual team members could also come from outside the organization, while Baba et al. (2004, p. 548) define a globally distributed team as "an interdependent work group comprised of culturally diverse members based in two or more nations who share a collective responsibility for making or implementing decisions related to a firm's global strategy." In a similar vein, Cramton (2001, p. 346) defines geographically dispersed teams as

"groups of people with a common purpose who carry out interdependent tasks across locations and time, using technology to communicate more than they use face-to-face meeting."

According to Bettenhausen (1991, p. 348), membership in a team impacts "how people see themselves, feel about themselves, and act in the group." Team members identify strongly with the team rather than with the organization (Knippenberg and Schie 2000). This happens because the organization, being so large, poses a threat to the team members' individual characteristics, while the smaller environment of the team offers more commonality, and the small-group setting creates fellow-feeling and mutual identification. One implication of team identification being stronger than organizational identification is that measures to enhance strong identification with the organization could be implemented at the team level rather than at the organizational level. Still, matters beyond the team and even beyond the organization also influence the project: for example, Hofstede et al. (1990) found that while organizational culture had more context-specific influence pertaining to work practices, national culture guided the priorities of team members based on underlying values.

A project team works across inter-organizational environments – within and outside the multi-national client or vendor organization – meaning that the team is surrounded by several organizational cultures. As many scholars have noted, this could pose difficulties for the effort to create "strong, shared working cultures" (Brannen and Salk 2000, p. 452). Earley and Mosakowski (2000, p. 47) argue that diversity within the team, especially national heterogeneity, cannot be "an inherent characteristic of effective teams," while Newman and Nollen (1996) argue that management practices need to be adapted to the national culture (Hofstede dimensions) to become effective. In a similar vein, Gibson and Zellmer-Bruhn's (2001) study about the concept of teamwork in France, the Philippines, Puerto Rico, and the United States found that different countries associate teamwork with varying concepts. These concepts include metaphors as varied as the military, family, sport, associates, and community, and concepts are not always shared between teams from different countries because of distinct underlying values. There are also some characteristics specific to software projects, which we discuss below.

Glaser (1984) distinguishes a software project from on-going general management, noting that a software project has a specific objective, a specific time period, a budget for capital expenditures and operating expenses, and an ad-hoc team that includes part-time members. The formation of ad-hoc teams poses challenges as no two information systems are alike and each project forms a unique undertaking. Lakhanpal (1993) found in his empirical survey covering 31 completed software projects within a large US electronic company that the performance of software project teams is highly dependent on the team's cohesiveness and capability. The total amount of team member experience in software projects was found to have the weakest influence in the performance of project teams. Further, Hoegl and Gemuenden's (2001) empirical study of 145 software development teams in co-located conditions found that teamwork quality – defined by constructs such as communication, coordination, balance of member contributions, mutual support, effort and cohesion – affects team performance. Again, cultural differences may pose problems: Carmel (1999) maintains that cross-cultural teams find the development of cohesion more difficult.

Apte and Mason (1995) assert that information-intensive services like software projects, with their high information intensity and little need for customer and physical presence have substantial potential for global dispersion. In their framework, a software development project appears ideal for global outsourcing. However, the nature of software project makes them vulnerable to failure (Brooks 1995; Hoch et al. 2000). Sahay, Nicholson and Krishna (2003) found software projects challenging to manage even in co-located conditions. Having the team members spread around various organizations and countries, especially in the global development scenario, further complicates the management of a project, making it "far more challenging than co-located projects" (Kotlarsky and Oshri 2005, p. 37).

The complexity of software increases in nonlinear proportion with its size, so that the larger a software project is, the more vulnerable it is to failure (Hoch et al. 2000; Kappelman, McKeeman and Zhang 2006). The difficulties in managing software projects stem from the inherent interdependencies and complexities of the knowledge-intensive

development of software entities (Brooks 1995; Hoch et al. 2000). Brooks (1995, p. 183) notes the following about the complexity of software systems: "Many of the classical problems of developing software products derive from this essential complexity and its nonlinear increase with size. From the complexity comes the difficulty of communication among team members, which leads to product flaws, cost overruns, schedule delays. From the complexity comes the difficulty of enumerating, much less understanding, all the possible states of the program, and from that comes the unreliability."

In his widely-cited paper "No silver bullet," Brooks (1987) maintained that there is no magic solution to the poor performance of software projects. His observations still hold true. Software development remains an endeavour that is "communication-intensive, complex and difficult even in conditions of co-location and proximity" (Sahay, Nicholson and Krishna 2003, p. 245). As software development forms an "intellectually demanding creative activity," intensive coordination and control throughout the development stages is necessary to achieve the project objectives (Ewusi-Mensah 2003, p.8). Kraut and Streeter (1995) argue that with increased project size and complexity, coordination becomes more difficult; they stress the importance of applying formal impersonal, formal interpersonal, as well as informal interpersonal procedures to managing projects.

Uncertainty since the start of the project is another characteristic of software development projects that makes them prone to failure (Hoch et al. 2000). Therefore, the early stages of the project form the most critical path to the success (Ewusi-Mensah 2003; Bhat, Gupta and Murthy 2006). The effort and intensity that go into the requirement analysis and design stages will reduce the number of changes that are required after the test phase. It is much more expensive to make changes to the software during the later stages than in the critical early stages (Flowers 1996; Ewusi-Mensah 2003). Rework and retesting of the system will increase the project's costs and lengthen its duration. Hoch et al.'s (2000, p. 97) metaphor of upstream and downstream phases notes that the uncertainty for software development projects will be higher "in terms of the final outcome as well as in terms of schedule, cost, and other project parameters" during the upstream phase (figure 4) because of unclear customer requirements, not entirely predictable design, changing requirements and changing technology. The

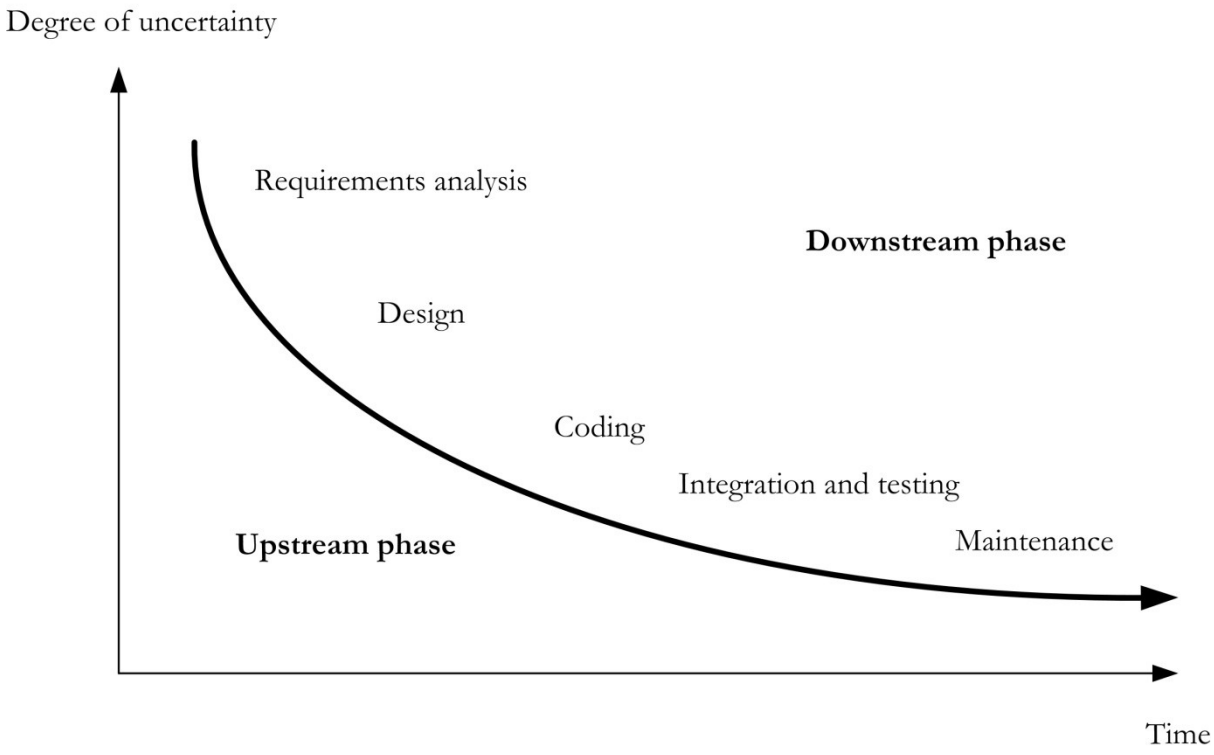

Figure 4: Upstream-downstream framework (Hoch et al. 2000, p.98)

uncertainty gradually reduces as the project progresses towards the downstream phase. However, Hoch et al. (2000) note that there will be a residual uncertainty or risk even after the project reaches the maintenance phase. Paying attention to such uncertainty is obviously important in understanding project failures. Below, we discuss software project risks that are manifested during the project as EWSs as well as their management in projects.

Schmidt et al. (2001) assert that identification and analysis of software project risks has gained a prominent role in improving the management of software projects and thus in reducing the chances of project failures. Software project risks that cause project failures may appear as risk events with unexpected outcomes during the initial project stages (El-Masri and Rivard 2010). Among various definitions of risk, Barki et al. (1993, p. 206) define software development risk as "the uncertainty surrounding a project and the magnitude of potential loss associated with project failure." Ropponen and Lyytinen (2000, p. 99) define risk as "a state or property of a development task or environment, which, if ignored, will increase the likelihood of project failure." Echoing this, Wallace

and Keil's (2004, p. 70) definition describes risks as "factors than can, when present, adversely affect a project, unless project managers take appropriate countermeasures." On the other hand, Applegate, Austin and Soule (2009, p. 312) view risks in a more positive light, as "an essential characteristic of projects that promise benefits." Assessing risks and taking action to mitigate risks are the two major process stages identified in the software project risk management literature (Schmidt 2001). Some of the major works in risk management regarding assessment and mitigation of risks are discussed below.

McFarlan (1981), in his early risk management work, has proposed three project risk dimensions that are inherent in a project: project size, experience with technology, and project structure. Applegate, Austin and Soule (2009) reiterate the relevance of these risks as sources of project implementation; they suggest that requirements volatility poses more concrete risk than project structure. Gogan, Fedorowicz and Rao's (1999) analysis of two case studies with their inherent characteristics of time constraints and system interdependence further extended McFarlan's (1981) risk assessment framework by adding the above two dimensions.

Boehm's (1991) early work regarding software project risks in the defense industry identifies risks and offers a risk management framework composed of risk assessment and risk control. He suggests the need for "explicit early concern with identifying and resolving … high-risk elements." Further, a Delphi survey conducted by Schmidt et al. (2001) in the United States, Hong Kong, and Finland captured the differences of general risk perceptions in terms of national cultures. Wallace and Keil (2004) develop a risk categorization framework based on the importance of risk and control perceptions by project managers. They found project execution risks associated with project teams, project complexity, and project planning and control to be of high importance in determining the project outcome.

Keil et al. (1998, p. 76) maintain that the reason behind high project failure rates is that "managers are not taking prudent measures to assess and manage the risks involved in [software] projects"; they develop a software risk categorization framework based on the risks identified in Schmidt et al.'s (2001) Delphi study. Based on the perceived relative

importance of risk and perceived level of control by project managers, they suggest four risk categories: customer mandate, scope and requirements, execution, and environment.

The higher-level framework and mitigation strategies presented in Keil et al. (1998) provide an instrument for dealing with risks collectively as a category, rather than individually. Their study also notes that project managers perceived as the most important risks those that were attached to phenomena they could not directly influence, such as customer mandate as well as scope and requirements not under their direct control. Risks related to execution were found to have moderate importance as they were under project managers' direct control. However, we found in our preliminary research (Philip, Schwabe and Wende 2010) that risks related to environment and execution are equally important in the offshore context.

Wallace and Keil's (2004) survey of 507 software project managers uses the risk categorization framework by Keil et al. (1998) to study the interaction of project risk categories. Their statistical multiple regression analysis examines product and process outcomes, and concludes that managing risks related to scope and requirements, on the one hand, and execution, on the other, is critical for project success. Further, project execution risks associated with project teams, project complexity, and project planning and control were found to be twice as important as scope and requirements risks in determining the project outcome. Further, Cule et al. (2000) note the necessity of recognizing the unique nature of each IS project and the consequent need for specific tactics depending on internal and external risks.

Although the risk studies of most researchers implicitly assume that collaboration between clients and vendors is taking place, only a few authors have studied outsourcing and offshoring risks specifically. Taylor's (2006) study on outsourcing risks found issues that are of an intractable and unforeseen nature. Intractable issues arose despite project managers' best efforts to address risks before the project started. Client expectations, Taylor found, form the key risk that needs to be managed to ensure project success. Smith and McKeen (2004) consider offshore-outsourced engagement risks from the organizational perspective, including language, culture, time differentials, and project

management skills. Further, Iacovou and Nakatsu's (2008) Delphi survey identified offshore-outsourced risks that organizations needed to consider in order to avoid engagement failures. Out of 25 risks they identified, nine were specific to the offshore project environment; they also note that project managers required more than the fundamental project management skills to successfully execute offshore projects as a result of higher risk exposure. Sakthivel (2007), by contrast, highlights the importance of teamwork: assessing the risks involved in offshore development, he concludes that team effectiveness formed the highest risk in offshore outsourcing as well as in captive outsourcing. He notes that teamwork "with a high degree of interdependent tasks for a diverse team warrants face-to-face interaction" (p. 70), which is the case for offshore-outsourced projects involving knowledge complexities.

An important risk factor in project failures is the escalation of commitment behavior leading to unintended results (Keil and Montealegre 2000; Mähring et al. 2008). Keil and Montealegre (2000) studied the de-escalation measures for projects exhibiting escalation of commitment towards a failing course. They found four phases involved in the de-escalation procedure, namely, recognizing the problem, reexamining the present course of action, searching for alternative courses of action, and implementing an exit strategy. These strategies could prove effective in recognizing and managing the EWSs of failing projects and rectifying them. We discuss some relevant theories applied in the IS literature to explain software development performance and team interactions below.

Software project team development in organizations can be elegantly explained using the theoretical framework developed by McGrath (1991). His time, interaction, and performance (TIP) theory of groups offers a nonsequential model of team development (Mennecke, Hoffer and Wynne 1992) that is applicable to understanding the problems of OOSD project teams. This theory has been widely employed in the social sciences as well as in information systems research to study group changes over time (e.g., Warkentin, Sayeed and Hightower 1997; Burke and Chidambaram 1999). Time, interaction, and performance are the three dimensions that are unique for group projects. The TIP theory posits that group members engage in multiple, concurrent projects, and any group action involves modes and functions that contribute to the organizational and group

development (see appendix A for propositions). The group modes – inception, problem-solving, conflict resolution, and execution – do not follow a fixed sequence of phases and group members can follow different mode paths in concurrent projects. This contrasts with Tuckman's (1965) popular model, often applied by practitioners, of progressive team development (Mennecke, Hoffer and Wynne 1992). Tuckman's model follows a sequence of activities in four phases – forming, storming, norming, and performing. The early project phases build the groundwork for project success and the identification of group activities that go through different modes and functions provide explanations of the project performance. However, the TIP theory has some limitations for explaining the development of project teams involving multiple vendor and client organizations, as it was conceived for groups within a single organization.

Dennis, Fuller and Valacich (2008) apply the TIP theory to explaining the communication processes in dispersed teams, something that is applicable in the OOSD project context. Their theory of media synchronicity explains communication processes in terms of conveyance and convergence of information within teams. The more familiar the context, the less emphasis on convergence of meaning between members is required, and vice versa. The next section takes up this question of the project context of IT offshoring.

2.3. IT offshoring

Literature reviews by Dibbern et al. (2004), Gonzalez, Gasco and Llopis (2006) and Lacity et al. (2010) reveal that most of the research in the area of IT outsourcing (and also IT offshoring) takes the organizational perspective. Wiener, Vogel and Amberg (2010) review the IT offshoring literature from the project management as well as from the organizational perspective. There has been an increase of research in the area of IT offshoring since the 2000s; however, empirical research from the team perspective remains limited. We will review some major works from the organizational and team perspectives in this section.

The agency theory explains the relationship aspects between client (principal) and vendor (agent) in IT outsourcing using the contract as a metaphor (Jensen and Meckling 1976;

Dibbern et al. 2004). The agent is assumed to have access to more private information than the principal and the consequent information asymmetries allow the agent to hide information during the engagement (Baiman 1990). Differing risk attitudes and goals, as well as uncertainties, define the hidden behaviors and actions of actors during the cooperative contracting period (Ross 1973; Eisenhardt 1989a). An outsourced software project is a case of an agency problem due to the intangible nature of software and the difficulties in monitoring incomplete contracts (Keil, Mann and Rai 2000). Imperfect monitoring and verification problems (Eisenhardt 1989a) posed by offshore-specific conditions may mean that the agent is not compelled to behave according to the principal's interest. In particular, using short-term contracts (Eisenhardt 1989a) in OOSD projects could result in greater information asymmetries between the actors than using long-term ones. These difficulties explain why additional governance is required for OOSD projects compared to domestic outsourcing projects. Below, we discuss various dimensions of IT offshoring that exacerbate the problem of imperfect monitoring in projects involving onshore and offshore teams.

IT offshoring adds more risk dimensions than IT activities carried out on the same continent, as cross-border business activities increase risks (Carmel and Tjia 2005). Risks are inherent in IT offshoring because of the semi-globalized state of the world (Ghemawat 2007). Aspray, Mayadas and Vardi (2006) discuss threats and vulnerabilities that are absent in domestic outsourcing compared to IT offshoring. The major risk categories in the literature associated with offshore IT projects from the organizational perspective are the following:

- Culture (e.g., Apte et al. 1997; Karolak 1998; Aspray, Mayadas and Vardi 2006; Beulen, Ribbers and Roos 2006)
- Language barriers (e.g., Apte et al. 1997; Aspray, Mayadas and Vardi 2006; Beulen, Ribbers and Roos 2006)
- Time-zone differences (e.g., Apte et al. 1997; Beulen, Ribbers and Roos 2006; Lee-Kelley and Sankey 2008)
- Human resources (e.g., Gold 2005; Aspray, Mayadas and Vardi 2006; Beulen, Ribbers and Roos 2006)

- Rotating onshore and offshore resources (e.g., Gold 2005; Beulen, Ribbers and Roos 2006)
- Loss of proprietary knowledge (e.g., Carmel and Tjia 2005; Hussey and Hall 2007)
- Infrastructure (e.g., Carmel and Tjia 2005; Beulen, Ribbers and Roos 2006)
- Security and privacy (e.g., Carmel and Tjia 2005; Gold 2005; Aspray, Mayadas and Vardi 2006; Beulen, Ribbers and Roos 2006; Hussey and Hall 2007)
- Knowledge transfer (e.g., Beulen, Ribbers and Roos 2006; Oshri, van Fenema and Kotlarsky 2008)
- Understanding the customer's business processes (e.g., Beulen, Ribbers and Roos 2006; Iacovou and Nakatsu 2008)
- Geopolitical risks (e.g., Carmel and Tjia 2005; Beulen, Ribbers and Roos 2006)
- Contractual risks (e.g., Carmel and Tjia 2005; Iacovou and Nakatsu 2008)
- Societal and regulatory changes (e.g., Apte et al. 1997; Carmel and Tjia 2005; Gold 2005)

Kelly et al. (2010) assert that project management in global projects could be viewed as socio-material "sense-shaping." This includes interactional social protocols among the onshore and offshore teams involved, discursive practices, and configurational collective moods of interactions. Similarly, Vlaar, van Fenema and Tiwari's (2008) case study with an Indian offshore vendor found that socio-cognitive acts and processes of sense-making and sense-giving by onshore and offshore team members led to better outcomes in distributed projects. Below, we review an important dimension that affects sense-making in OOSD projects, namely, cultural differences.

Cultural distance has been widely cited as one of the factors affecting the outcome of global collaborations (Hinds, Liu and Lyon 2011). We include some of the varying definitions of culture here. Hofstede (1984, p. 260), in his seminal work regarding cultural orientations at the national level, which surveyed around 116,000 IBM employees in 40 countries in 1968 and 1972, defined culture as "the collective programming of the mind which distinguishes the members of one human group from another." The four cultural

dimensions that Hofstede (1984) defined include power distance, individualism, masculinity, and uncertainty avoidance; these were defined as static traits that remain unchanged over decades. Other definitions of culture include, for instance, Spencer-Oatey (2004, p. 4), who proposes that culture is "a fuzzy set of attitudes, beliefs, behavioral norms, and basic assumptions and values that are shared by a group of people, and that influence each member's behavior and his/her interpretations of the 'meaning' of other people's behavior"; Kitayama (2002, p. 92), who views culture as a dynamic system of behavior with "meanings, practices, and associated mental processes and responses" that are loosely organized and entrenched in the local context; and Chao and Moon (2005, p. 1128), who regard the complexity involved in culture as a mosaic with "multiple indicators of cultures," with the person's demographic, geographic and associative attributes forming various tiles in the mosaic.

Applying the concept of culture to groups, Karahanna et al. (2005, p. 4) maintain that group culture becomes an "important factor in the interactions and effectiveness of groups." They propose that cultural values and practices at varying levels of supranational (regional, ethnic, religious, linguistic), national, professional, organizational, group, and individuals are interrelated to each other. Further, they contend that practices (which evolve over time) are more relevant than values at the group and organizational levels, whereas values (which hardly change over time) are dominant on the supranational and national levels of culture. Also considering the different levels at which culture influences behavior, Leung et al. (2005) propose that culture is a dynamic multi-level and multi-layer construct that affects all levels (global, national, organizational, group and individual) in a top-down as well as a bottom-up manner, while Leidner and Kayworth's (2006) review of culture proposes a tripartite view of IT-culture conflict, in which IT values, group member values and values embedded in an information system provides the key to conflicts.

Peterson et al.'s (2002) empirical work on the perceptions of IS designers from the United States, Japan, and Korea regarding success and failure factors shows consistency with Hofstede's (1984) cultural dimensions. An interpretive case study by Levina and Vaast (2008) of a major Western global bank with captive units and outsourcing vendor

collaborations in Russia and India compared the differences in competencies, interpersonal connections, and social dimensions. Their empirical work from the organizational perspective also clearly illustrates the cultural differences between countries like India and Russia. However, Dibbern (2004) points out that the empirical works in this tradition, including Hofstede (1984), Trompenaars (1993) and others, are based on statistical averages and therefore hide inevitable variation in the cultural dimensions across organizations. This is relevant as team members hailing from different cultures and origins in multi-national organizations involved in offshoring form a "cultural mosaic" (Chao and Moon 2005).

Gefen and Carmel (2008) suggest that to outsource from a foreign country, clients must overcome *the cost of cultural distance*, in addition to transaction costs. They found that previous relationships played the strongest role in choosing vendors in general, and that most clients showed a preference for outsourcing to a vendor in their own country – except for Americans, who preferred offshore vendors. Dibbern, Winkler and Heinzl (2008) argue that transaction costs increase with the differences in cultural values and practices between vendors and clients. Taking a similar tack, Beck, Gregory and Prifling's (2008) case study of an Indo-German project argues for the relevance of combining formal and informal project management measures with the 'cultural intelligence' of project members to produce the expected outcome. A mutual understanding of organizational culture among vendor and client team members, Beck, Gregory and Prifling conclude, is the key to effective results. Further, Winkler, Dibbern and Heinzl's (2007) analysis of Indo-German case studies concludes that the power distance between team members affects the management of software projects and the adoption of either vendor or client culture by the team is more likely to lead to a successful outcome.

Carmel and Tjia (2005) discuss five centrifugal forces that affect offshore software development and thus influence the performance of team members. These include communication breakdown, coordination breakdown, control breakdown, cohesion barriers and cultural clash. Based on three cases of offshore software development projects, Heeks, Krishna and Nicholson (2001) argue that there exist geographical, cultural, and linguistic distances between the client and vendors that affect the

relationship; the main factors determining relationship outcomes, they find, are culture, tacit knowledge, and informal information. Culture affects the concept of temporal separation, according to Huang and Trauth (2008), who analyze the cultural[4] influences on the temporal separation and coordination of global software projects. The cultural differences they found to be relevant include the perception of time, hierarchical structure, relationship orientation, and social obligation. Based on cultural differences, Narayanaswamy and Henry (2005) propose a design for a control strategy that fits the cultural setting and thus improves project performance in offshore software development.

Further, Sahay, Nicholson, and Krishna's (2003) empirical work analyzes six case studies involving organizations from North America, the United Kingdom, Japan, and Korea that engaged in software development projects with Indian software companies. Tensions of space and place, issues of power and control, transformations of identity, tensions of standardization, complexity of knowledge transfer, and language and culture were identified as the major challenges involved in global software development works. Krishna, Sahay and Walsham's (2004, p. 64) investigation of cross-cultural issues that outsourcers from North America, Western Europe, and Japan experienced with Indian software providers concludes that cross-cultural software production "is not a trouble free process." They suggest that because of the importance of a cultural match between countries, the choice of 'culturally neutral' projects such as embedded software and middleware could reduce cross-cultural issues. Further, the development of application software is recommended only when the right cross-cultural match between nations – such as Japan-China or United States-Canada – is present; otherwise, major efforts through staffing or training are essential. Interestingly, the success of India in offshore software development has been in application software as against the culturally neutral software recommended by Krishna, Sahay and Walsham (2004).

[4] Huang and Trauth (2008, p. 3) define culture as "shared values and beliefs that are historically situated and emergent, and are constantly interpreted and negotiated in social relations and interactions by a group of people within a particular socio-cultural context."

Using data from the International Benchmarking Standard Group (ISBSG) during the period 1991-2003 (57 paired projects), Bagchi, Kirs and Udo (2007) argue that offshored projects require more time to complete than onshore projects, and emphasize the critical role of communication in the early stages. Herbsleb and Moitra's (2001) find that multisite software development takes longer to complete than co-located development because of communication and coordination delays. Further, Ebert and De Neve's (2001) case study of global software development projects in a multinational company also provides empirical support for the significance of communication and coordination in achieving project success in globally dispersed teams. To illustrate the differing interpretation of symbols in different cultures, they argue that even "a common syntactical language does not necessarily mean the same semantics and pragmatics" (p. 68).

Fabriek et al.'s (2008) analysis of successful and failed offshore outsourced and captive software development projects has shown that informal communication between team members has played the key role in successful outcomes. Improper planning, they find, is the main reason for failed projects. Prikladnicki and Audy's (2009) case studies of captive and outsourced offshore projects also point to communication problems between team members as key. Communication between team members affects knowledge transfer since the distances affect the complete and unambiguous knowledge transfer (Fabriek et al. 2008; Wende, Schwabe and Philip 2010).

Further, Damian and Zowghi's (2003a) case analysis of captive software development in the United States and Australia concludes that face-to-face communication improves informal communication and thus heightens trust between the team members. Oshri, Kotlarsky and Willcocks (2009) argue that face-to-face meetings improve social ties and offer better possibilities for coordinating tasks between team members. They argue that communication and coordination aspects are the most critical in the early project stages. Similarly, based on the statistical analysis of 34 software projects from two Indian vendors, Gopal et al. (2002, p. 199) conclude that the "communication and coordination between customers and vendors has complex effects on project performance."

Carmel and Agrawal (2001) note that physical distance between team members engenders coordination, control and communication problems. The main challenge identified by Carmel and Agrawal (2001) in global software development is the negative impact of distance on communication and its negative impact on coordination. Carmel and Abbott (2006) study the configurations of global software development in offshore and nearshore destinations and find that "distance still matters." According to Carmel and Abbott (2006), the difficulties introduced by distance include communication, control and supervision, coordination, creating social bonds and building trust. They found India to be the only and unique major farshore or offshore destination that is far from all major client nations. Some clients try to minimize the disadvantages of distance by choosing software services offered by firms that are geographically close to the clients (nearshore) but less expensive than in the client country (Carmel and Abbott 2006). This could explain why Indian and other offshore service providers have established subsidiaries in client countries in recent times and offer nearshore services to major clients in the United States, United Kingdom, and Switzerland by operating from nearshore countries like Canada, Mexico, or Hungary. Interestingly, Gumm's (2006) case study analysis concludes that it is not the physical but the organizational distance within the project team and between the team members that forms the biggest challenge in distributed projects.

Ramasubbu et al.'s (2008) empirical work on 42 offshore software development projects of a CMM (Capability Maturity Model) Level 5 verified vendor reports that investments in structured processes can mitigate the negative effects of work dispersion. The better productivity and project performance that Ramasubbu found in the analyzed projects confirm the vendor claim that higher process levels can lead to successful projects, although process improvements made only at the vendor side will not suffice to avoid failures. On a similar note, Rottman and Lacity (2006) recommend that client organizations elevate their process gaps in terms of CMM certification to get them close to the vendor level and thus extract better value, as most top Indian vendors have CMM Level 5 certifications. Further, Hertzum and Pries-Heje's (2009) case study of an Indian-Danish collaboration shows the success of defining roles and responsibilities: this reduced interactions between team members, thus minimizing the impact of inequalities in terms of culture and process maturity.

Casey's (2010) case study of a US company with teams in Malaysia and Ireland points out that virtual software project management is a "difficult and complex endeavor" (p. 84) because of language, cultural and time differences, and also because the dynamic environment with its specific requirements has to be addressed. She argues that distance affects coordination and visibility as well as communication and cooperation, and these two categories in turn affect each other. Further, Ramesh and Dennis (2002) argue that the major challenge for global team members lies in communication between team members and coordinating the team activities. They propose the concept of an object-oriented team for virtual teams that decouples team member communication by the use of well-defined processes, semantically rich media (repositories), and the reduction of information flow in large and complex projects. However, they do not recommend this type of team member decoupling for traditional integrated teams in small and less complex projects. In particular, more coordination is required in the early stages of requirement analysis than in the later stages for team activities.

Prifling, Gregory and Beck (2009) report that the introduction of more formal project management led to project success after the deliverables in an Indo-German project failed to meet the initial expectations from the client. Once a level of trust has been established, the amount of formal project control could be reduced. Further, Sharma et al. (2008) argue that the differences in language, culture and personalities could affect trust building, and thus influence the technical communication[5] in projects. Based on an examination of captive software projects, Kotlarsky and Oshri (2005), emphasize the importance of social ties, especially rapport and trust between globally distributed team members, for successful collaboration. They highlight the relevance of social interactions, which aid informal communication in projects.

[5] Sharma et al. (2008, p. 64) define technical communication as "communication activities that take place between a client and vendor based on the outsourcing contract managed by client as well as vendor project managers using different communication modes – from the exchange of information (explicit) to the sharing of nuanced intelligence (tacit)."

Sabherwal's (2003, p. 154) case studies on coordination mechanisms between vendors and clients find that two sides can "pull project coordination in different directions." However, Sabherwal also concludes that the end result in these cases was somewhere in the middle, i.e., more formal coordination was used than the client wanted and more informal coordination using interpersonal interactions was employed than the vendor desired. Further, Kotlarsky, van Fenema and Willcocks (2006) describe four coordination mechanisms related to knowledge management in global software projects that lead to better collaboration: coordination by organization design, work-based coordination, technology-based coordination and social coordination. Improved social interactions through communication activities were found to result in better efficiencies related to coordination and communication.

2.4. Early warning signs

The business economist Ansoff's (1975) seminal work in the area of the corporate strategic management notes that sudden and unfamiliar changes in an organization's environment result in strategic discontinuity, which are noticed first as weak signals that become more specific and stronger with time. He offers a framework for minimizing strategic surprises by anticipating strategic risks based on states of knowledge. The five states based on threats or opportunities (T/O) with increasing knowledge are: (1) sense of T/O, (2) source of T/O, (3) T/O concrete, (4) response concrete, and (5) outcome concrete. Ansoff's seminal work set off a spate of academic and practitioner studies in the areas of communications, military intelligence, and business economics (Nikander 2002) that used weak signals under synonyms such as symptoms, early indicators, presignals, and early warning signs.

Nikander and Eloranta's (2001) study of EWSs in the industrial construction projects concludes that most of the information regarding EWSs comes from within the project. They identify sixty-eight basic types and 11 main type groups of early warnings based on four project cases and interviews with 17 project professionals. An observed event or indication can be interpreted as a warning, a problem, or a cause of the problem depending on the project stages (Nikander and Eloranta 2001). Figure 5 illustrates the overlap they describe between the groups of warnings, problems and causes of problems.

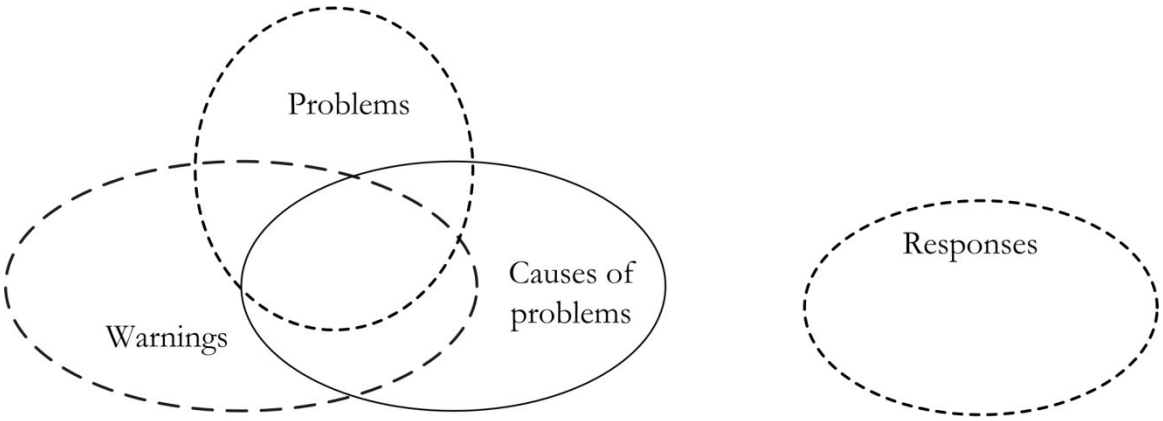

Figure 5: Warnings, problems and causes (Nikander and Eloranta 2001, p. 395)

However, these overlapping possibilities in Nikander and Eloranta's exploratory work result in a lack of a clear differentiation of warnings, problems, and causes that does not allow project managers to detect EWSs unambiguously. These overlaps could lead to incorrect interpretations regarding the problem causes and thus to erroneous responses to the problems.

The interviewees of Nikander and Eloranta's (2001) study indicated the possibility of utilizing EWS as a project management tool. Further, Nikander and Eloranta (2001) suggest an EWS framework that involves monitoring and analysis of early warnings, problems, and causes of problems (figure 6). As risks refer to a likely problem, they found that the information related to early warnings could help manage emerging risks and offer responses by finding the causes of the problem. While the dependencies between early warnings, causes of problems, probable problems and responses are displayed, the exact relations or semantics between these concepts remain unclear. Nikander (2002, p. 49), without explicitly referring to project phases, defined EWS as "an observation, signal, message, or some other form of communication that is or can be seen as an expression, indication, proof, or sign of the existence of some future or incipient positive or negative issue. It is a sign, omen, or indication or future developments."

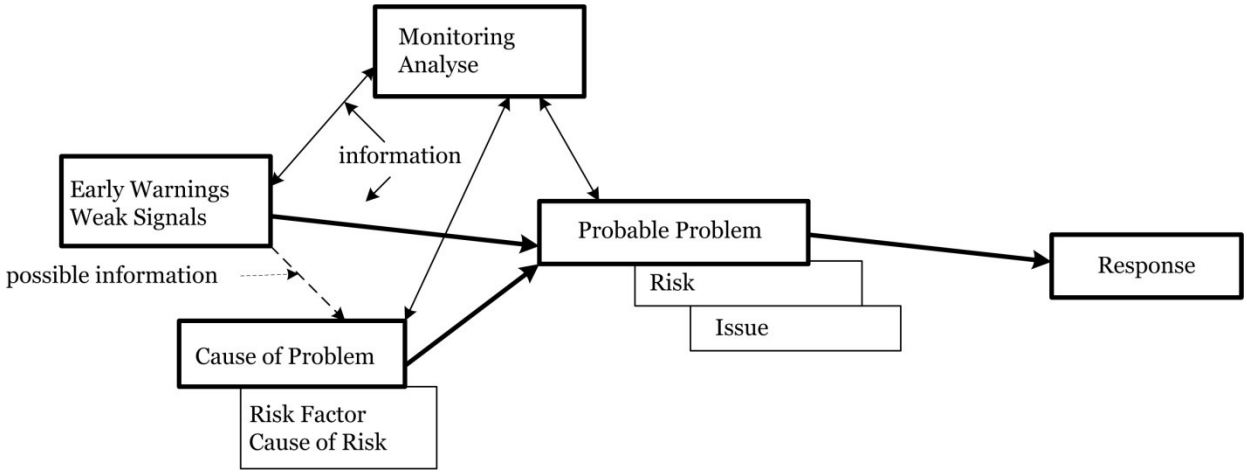

Figure 6: Concepts of EWSs and risk management (Nikander and Eloranta 2001, p. 395)

Havelka and Rajkumar (2006) analyze the symptoms and causes of troubled IS projects. Their study, based on the nominal group technique with four focus groups of 20 IS consultants, identifies 108 symptoms of troubled software development projects. Eleven categories of identified symptoms include: (1) client or stakeholder-related symptoms, (2) project's goal-related symptoms, (3) meeting symptoms, (4) team symptoms, (5) task symptoms, (6) project symptoms, (7) project management symptoms, (8) communication symptoms, (9) management symptoms, (10) project portfolio symptoms, and (11) process symptoms. Havelka and Rajkumar's (2006) work provides the most comprehensive list of symptoms in the area of software development to date. Further, Sanchez and Perez (2004) compile from the literature a list of early warning signals for research and development (R&D) projects; they then test this list in Spanish industrial organizations with 114 R&D managers. The signal list includes project internal and project external factors within an organization, related to critical success factors.

As opposed to works on EWSs that consider the whole project lifecycle, Kappelman, McKeeman and Zhang (2006) focus on the first 20 percent of the project lifecycle. This study in the area of IT projects identifies 53 EWSs in three risk categories defined by Wallace, Keil and Rai (2004), namely, social subsystem, project management, and technical subsystem. The identified EWSs were rated by 157 experienced IT project management experts in a survey that aimed to rank the most important EWSs of IT

project failure. All 12 dominant EWSs are located in the social subsystem and project management risk categories. Technical EWSs, Kappelman, McKeeman and Zhang conclude, are not the most relevant ones in the first 20 percent of the project lifecycle. The EWSs in the list were elicited from project experiences without details on how to recognize them concretely.

Klakegg et al.'s (2010) report for Project Management Institute (PMI), based on interviews and eight case studies in Norway, the United Kingdom, and Australia, discusses EWSs in complex projects from the project owners', or governance, perspective, as opposed to the project management or execution perspective adopted in the present study. They cover outsourcing projects in IT, oil and gas, construction, manufacturing, and public sector industries and differentiate EWSs into two types: hard issues of a technical nature that can be measured through project assessments and soft issues related to people that can be identified through gut feelings. They recommend the use of both types in projects and assert that the way EWSs are handled also affect their detection. Although they do not differentiate the EWS identification period during the project, they use three stages to differentiate EWSs – project set-up, early stages and project execution. Further, Klakegg et al. (2010, p. 149), while assessing the general inability to pick up EWSs, assert that "we do not understand uncertainty well, and we are not good at seeing through complexity or mastering interpersonal effects."

As several of the studies described above demonstrate, IS projects can learn from other areas regarding the detection of EWSs. Loosemore's (2000) model of crisis management in the construction industry deals with EWSs with regard to their visibility, which aids project managers in detecting them. He notes that visibility of EWSs is "determined by their intensity, duration, and subtlety" (2000, p. 31). EWSs are difficult to detect in project design, which is subtle and of low-intensity and short duration, as opposed to physical buildings that emit signals that are blatant and of high intensity and long duration. The intangible nature of software development further lowers the visibility of EWSs.

The KPMG survey of 120 organizations in the United Kingdom regarding failed projects known as runaway projects (Cole 1995) found that 89% had time overruns and 62% had cost overruns as symptoms of runaway projects. More than 50% of the projects in the survey showed symptoms during the development phase while 25% of the projects showed them in the early planning stage. Although, according to the above survey, cost and time overruns are symptoms of failing projects, the detection of these late warning signs provides no anticipatory information that a project is about to fail. In a similar vein, Sparrow's (2003) practitioner-oriented work discusses warning signals that could help alert outsourcing failures from the customer perspective. Her work investigates outsourcing relationship failures from the organizational perspective, and she examines warning signals that could appear at any project stage, meaning that some of them were late warning signs.

Our own preliminary research on offshore software development projects found 21 EWSs in four categories: communication, people, formal process, and formal output-related EWSs (Philip, Schwabe and Wende 2010). The offshore-specific EWSs identified by that work are all related to team communication and coordination, showing the relevance of interaction among team members in OOSD projects to avoid project failures. In that work, we explored the EWSs relevant to offshore projects, but whereas that work analyzed offshore projects in general (captive as well as outsourced offshoring), the present study concentrates specifically on the offshore-outsourced context.

In his 1984 work, Ansoff (1984) develops further the initial ideas of weak signals presented in Ansoff (1975), adding a temporal dimension. He defines weak signals as "imprecise, early indications about impending impactful events" and strong signals as issues that "will be sufficiently visible and concrete to permit the firm to compute their impact and to devise specific plans for response" (Ansoff 1984, p. 22). Based on the state of knowledge, defined in Ansoff (1975), and the available response time, one can choose a model for the management of issues from among periodic planning, weak signal management, strong signal management, or crisis management. Ansoff's model for strategic issue management for weak signals looks at impact, signal strength, and urgency to prioritize the warning signs. The priority levels available for issues based on

environmental, internal and performance trends are "urgent," "postponable," and "delayable" (figure 7). He recommends actions based on the impact and urgency of issues

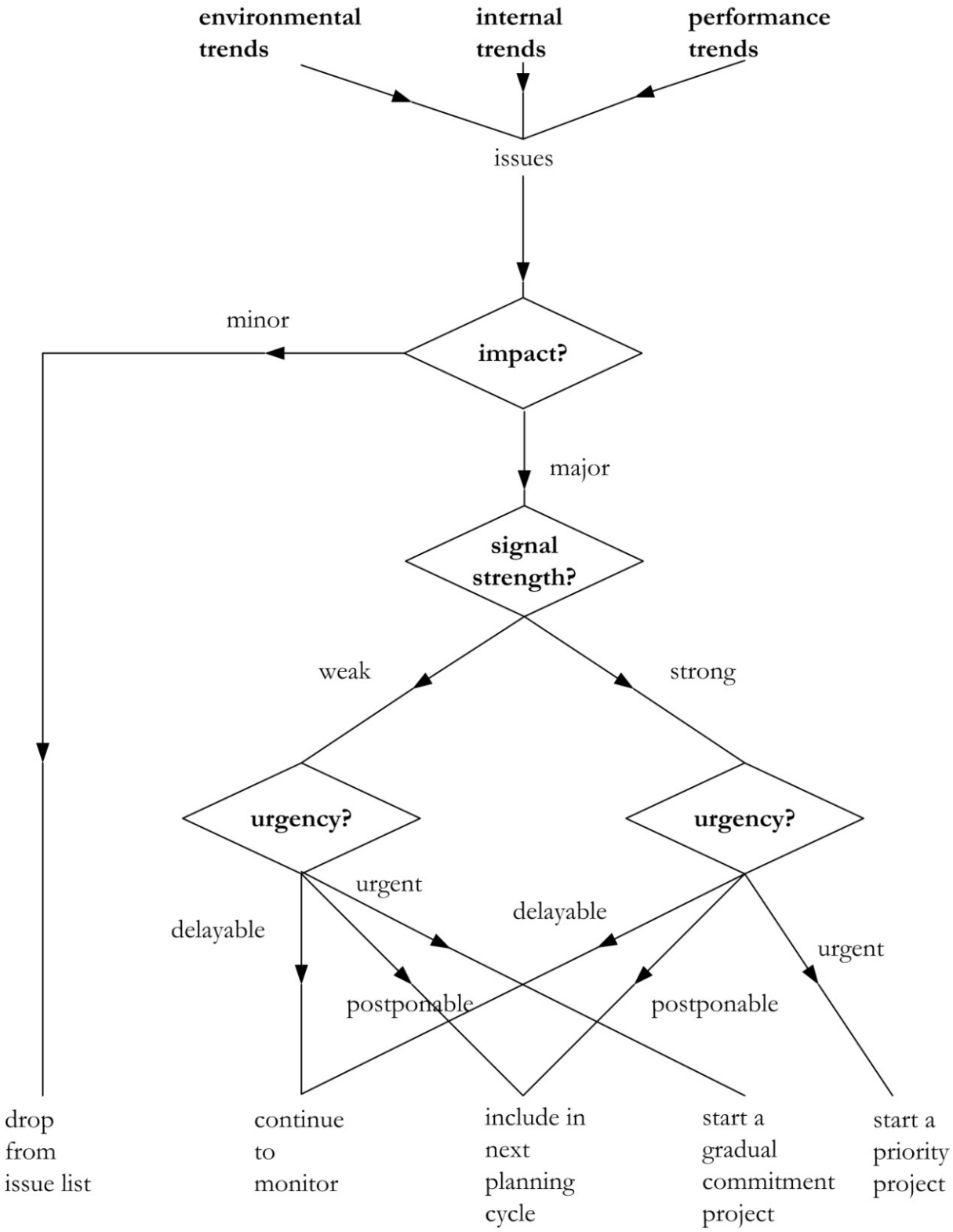

Figure 7: Priority assignment in strategic issue management (Ansoff 1984, p. 366)

on a periodic basis.

Havelka and Rajkumar (2006) develop a recovery framework for IS projects involving four stages and twelve steps. The four stages include recognition, immediate recovery, sustained recovery, and maturity. The strengths of their model include short-term recovery based on immediate steps as well as sustained project recoveries. Nikander (2002), too, offers a multi-step model for managing issues. His decision support model of EWSs consists of six stages, which are (1) detection of EWS, (2) interpretation of early warnings, (3) determination of the state of knowledge, (4) identification of problems or risks, (5) exploration of available time, and (6) selection of procedures.

The models presented in Ansoff (1984), Havelka and Rajkumar (2006), and Nikander (2002) provide comprehensive procedures for project managers to manage the warning signs; however, their applicability in a project context involving onshore and offshore teams from various organizations needs to be validated. They could turn out to be "cumbersome, slow and expensive for use" in fast-paced project work (Nikander 2002, p. 63), particularly in OOSD projects that involve collaboration between clients and vendors.

2.5. Summary and research gaps

In this section we summarize how the literature review has contributed to answering the research questions posed by the present study. Further, we outline the research gaps that demand further analysis.

The literature describes software teams as units involving ad-hoc members that fulfill a specific objective within a time frame and budget (Glaser 1984). Offshore outsourced software development (OOSD) project teams involve team members from multiple client and vendor organizations. The cohesiveness and capability of members have been found to affect the software project outcome within a single organization (Lakhanpal 1993; Carmel and Tjia 2005). However, the lack of cohesion in OOSD teams is not well understood. Distance and organizational culture affect communication among team members (Herbsleb and Moitra 2001). Informal communication, especially, is known to

lead to better project outcomes (Fabriek et al. 2008). Team interactions and the effectiveness of teams are affected by the cultural orientations of members (Karahanna, Evaristo and Srite 2005). Chao and Moon's (2005) metaphor of culture as mosaic tiles subsumes the variety of OOSD team members in terms of demography, geography, values and behavior.

Software projects are characterized from the outset by their uncertainty and complexity. Early project stages were found to be the most critical in terms of avoiding failures, as rectification of mistakes in later stages is expensive (Flowers 1996; Ewusi-Mensah 2003). Coordination measures involving interpersonal measures in formal and informal ways could help project managers cope with complexity (Kraut and Streeter 1995). However, both clients and vendors could pull coordination within projects in various directions (Sabherwal 2003). Interdependent knowledge chains among team members can be managed using coordination measures in terms of organization, work, technology and social interactions (Kotlarsky, van Fenema and Willcocks 2006). To be managed successfully, OOSD projects, because of their inherent offshore-specific risks, require more than fundamental project management skills from project managers (Iacovou and Nakatsu 2008). Research on IS failure has found that major failures can be attributed to organizational context, management processes, and project team capabilities within a project (e.g., Lucas 1975; Ewusi-Mensah and Przasnyski 1991; Flowers 1996; Yeo 2002). Ewusi-Mensah (2003) found inappropriate project-team composition to be an important socio-technical factor that leads to failure. However, research regarding software development failures (Ewusi-Mensah 2003) and OOSD project failures has been scanty and no existing research directly addresses the context of offshore failures.

The literature provides many hints toward answering research question #1 ("Which unique team-level aspects of offshore-outsourced software development projects lead to failures and how do they lead to failures?"). Several factors, including coordination, communication, organizational culture, explain the lack of success in offshore outsourced projects. However, it is not obvious whether those factors lead to failures directly, nor is the extent to which non-interactions in the early stages lead to failures well understood. Whether other aspects also lead to failures in the offshore outsourced context needs to

be explored further. The TIP theory offers a theoretical framework for explaining issues in a project within a single organization. However, failures in OOSD projects that involve multiple organizations cannot be explained using extant theories. The research gap between theory and empirical work in the offshore context requires an investigation into failed projects.

Several failure studies have discussed the reasons behind failure in software projects (e.g., Standish 1995; Ewusi-Mensah 2003); however, those studies do not differentiate between early and late project phases. Kappelman, McKeeman and Zhang's (2006) work addresses the EWSs of failure during the first 20 percent of the project's calendar, and concludes that social and project management risks are the dominant ones. Our own preliminary study of offshore project failures (without specifically studying offshore outsourcing) found coordination and communication factors to be relevant in the offshore context (Philip, Schwabe and Wende 2010). EWSs are identified through project assessments during the project and gut-feelings of project managers (Klakegg et al. 2010). Offshore-specific aspects that lead to project failure could plausibly affect the early project phases in OOSD projects.

The lack of studies regarding the EWSs of failure in the OOSD project context means that deeper analysis is required to answer research question #2 regarding the EWSs of failures in OOSD projects. It was formulated as the following: What are the early warning signs specific to offshore-outsourced software development project failures that are related to the project team and how can the project managers perceive them? In particular, several authors suggest that the influence of varying organizational and national contexts demands more analysis (e.g., Karahanna, Evaristo and Srite 2005; Huang and Trauth 2008). Little research exists on project failures and team interactions in the early phases; that is another area in need of further analysis. Also, even though project managers are closer to the project than other stakeholders and thus notice issues more quickly, few EWS studies concentrate on the project managers' perspective (with some exceptions, like Kappelman, McKeeman and Zhang (2006)).

The agency theory explains the difficulties involved in monitoring the actions and behaviors of actors and thus the inherent difficulty of detecting EWSs (Baiman 1990). Several factors related to software projects have been found to affect project managers' ability to perceive the EWSs of failure. The uncertainty of projects from the outset (Hoch et al. 2000; Klakegg et al. 2010) as well as the difficulties of understanding complexities and mastering interpersonal effects (Klakegg et al. 2010) affect their ability to see through issues. Further, risks that are under the control of project managers are perceived as the least important ones, which could lead to overlooking them (Keil et al. 1998). Wallace and Keil (2004) conclude that risks related to the project team are important determinants of project outcomes. However, there is a dearth of studies that analyze EWSs from the team perspective. Assessment and management of risks form the two stages in risk management. While there are some exceptions – for instance, Keil and Montealegre (2000) study de-escalation procedures regarding projects having escalation of commitment towards a failing course – it remains true that few studies offer insights regarding the management of issues in the early project stages (Ansoff 1984; Nikander 2002; Havelka and Rajkumar 2006).

The limits of the literature on EWSs constitute a gap in the research, revealing that there is insufficient research to answer research question #3 ("How are the team-level EWSs of failure managed by project managers in OOSD projects? Why are they not managed effectively?"). There are few guidelines for managing EWSs in a timely manner capable of putting projects back on track. The perception of early warning signs in the offshore-outsourced environment by project managers merits a deeper analysis. The issues known in the early stages may not always be acted upon (Williams et al. 2012). The reasons behind and the consequences of the failure to manage them in OOSD projects remain unexplored.

3. Research design and methodology

The survey of literature in the previous chapter reveals that there exist several research gaps in explaining project failures in the onshore-offshore environment. EWSs or issues in the early project phase, in particular, have attracted little attention. In order to gain a deeper understanding of the circumstances and situations that project managers face in OOSD projects, we have adopted a qualitative approach (Stebbins 2001; Denzin and Lincoln 2005) for this thesis. Given the scarcity of the literature both on EWSs and on project failures in OOSD projects, a qualitative approach is more appropriate than the validation studies or theory testing that are predominant within quantitative research.

A qualitative approach also matches well our study's explorative nature and its emphasis on deeper analysis of factors that predict failure and of the perception of EWSs of failure. As exploration qualifies "as primarily inductive" (Stebbins 2001, p. 7), analyzing the partially-known phenomenon of OOSD project failures requires inductive reasoning to understand the failure process. Based on its use of inductive reasoning as well as an explorative point of view, qualitative research could "uncover new ideas and observations" (Stebbins 2001, p. 8), which is why we apply qualitative rather than quantitative methods in this thesis. Theoretical models developed from qualitative exploration could then help improve the prediction of the phenomenon under study. In this chapter, we present the qualitative research design that we employed. Our discussion covers the philosophical foundation (positivism), the research approach (qualitative exploration), the research method (grounded theory), the data collection technique (interviews) and the data analysis approach (qualitative data analysis) (Myers 2008; see figure 8).

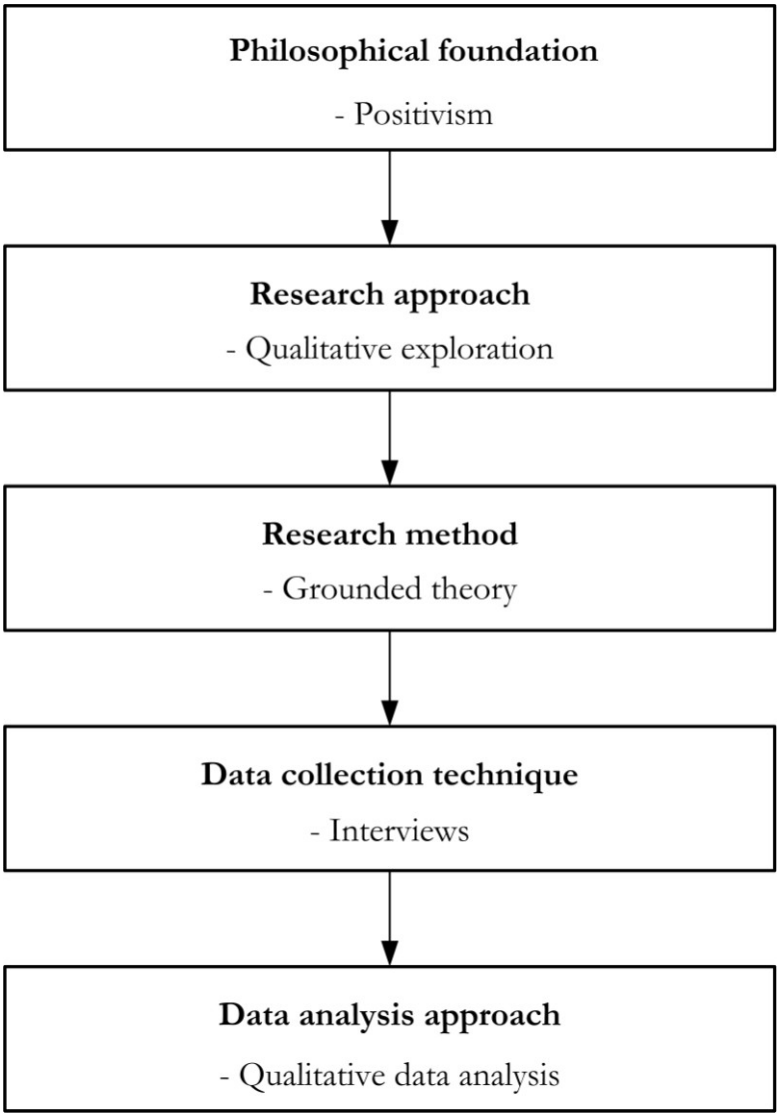

Figure 8: Qualitative research design (based on Myers (2008))

3.1. Positivism

Both quantitative and qualitative research are guided by basic underlying philosophical assumptions. Research in the social sciences has a positivist, interpretive, or critical underlying epistemology or set of philosophical assumptions (Myers 2008). Among these assumptions guiding research, positivist and interpretive approaches are the most common ones in IS research (Orlikowski and Baroudi 1991; Dibbern et al. 2004).

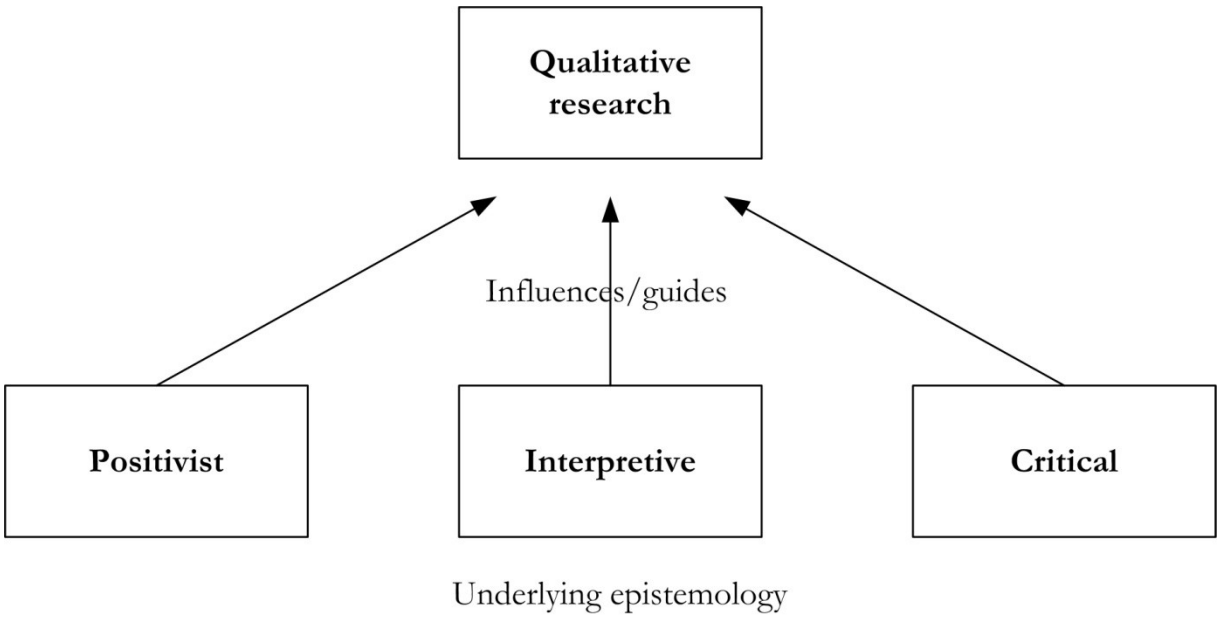

Figure 9: Underlying philosophical assumptions (Myers 2008, p.37)

Positivism is defined as the position that differentiates between facts and values, in which scientific knowledge comprises only facts (Walsham 1995). The reality, it is assumed, is "objectively given and can be described by measurable properties which are independent of the observer (researcher) and his or her instruments" (Myers 2008, p. 37). Positivists develop formal propositions, formulate hypotheses or draw inferences "about a phenomenon from the sample to a stated population." (Myers 2008, p. 37). These inferences will be based "on the existence of *a priori* fixed relationships within phenomena" (Orlikowski and Baroudi 1991, p.5).

On the other hand, interpretivists adopt "a non-deterministic perspective" (Dibbern et al. 2004, p.21) to understand a phenomenon, and they assume the position that the "knowledge of reality is a social construction by human actors" (Walsham 1995, p.376). Interpretive researchers "attempt to understand phenomena through the meanings that people assign to them" (Myers 2008, p.38). There is no assumption regarding "*a priori* understanding of the situation" (Orlikowski and Baroudi 1991, p.5) for the interpretive researcher.

The main differences between the positivist and interpretivist assumptions noted by the interpretive researcher Jörgen Sandberg are discussed by Weber (2004). Table 1 provides

a summary of Sandberg's views in terms of ontology, epistemology, research object, method, theory of truth, validity, and reliability.

Metatheoretical assumptions about	**Positivism**	**Interpretivism**
Ontology	Person (researcher) and reality are separate	Person (researcher) and reality are inseparable (life-world)
Epistemology	Objective reality exists beyond the human mind	Knowledge of the world is intentionally constituted through a person's lived experience
Research object	Research object has inherent qualities that exist independently of the researcher	Research object is interpreted in light of meaning structure of person's (researcher's) lived experience
Method	Statistics, content analysis	Hermeneutics, phenomenology, etc.
Theory of truth	Correspondence theory of truth: one-to-one mapping between research statements and reality	Truth as intentional fulfillment: interpretations of research object match lived experience of object
Validity	Certainty: data truly measures reality	Defensible knowledge claims
Reliability	Replicability: research results can be reproduced	Interpretive awareness: researchers recognize and address implications of their subjectivity

Table 1: Differences between positivism and interpretivism (Weber 2004, p. iv)

This research has been undertaken from a positivist philosophical perspective. We assume that the researcher and the reality of project failures are separate and that knowledge of project failures and of the EWSs of failure can be extracted by investigating the reality objectively from both the vendor and client perspectives. We draw inferences from a sample of failed projects to make generalizations (Orlikowski and Baroudi 1991) about the EWSs of failure that appear during the client and vendor collaboration. According to Stebbins (2001, p.11), "Social science exploration is positivistic, in part, because it is nomothetic, its principle [sic] goal being production of valid generalizations about a type of group, process, activity, or situation." The phenomenon of OOSD project failure exists independent of the researcher and thus the objective reality can be mapped using empirical methods.

The study of EWSs prior to failures and of the unique aspects of OOSD projects in the offshore-onshore environment, in which the interactions of several stakeholders from the client and vendor groups form a unique ecosystem, were undertaken using the grounded theory methodology. In contrast to the objective application of research quality criteria like reliability and validity in quantitative studies, the use of these criteria in qualitative research remains problematic (Kirk and Miller 1986; Stebbins 2001). The quantitative measures required to check the above criteria cannot be applied satisfactorily in qualitative research. Therefore, we adopted the qualitative criteria proposed by Corbin and Strauss (2008) to offer a robust qualitative research methodology. Their ten quality judgment criteria are: 1. fit, 2. applicability, 3. concepts, 4. contextualization of concepts, 5. logic, 6. depth, 7. variation, 8. creativity, 9. sensitivity and 10. evidence of memos. We believe that these criteria can roughly establish the validity and reliability in qualitative research. Criteria like coding concepts and memos ensure the replicability of the results, whereas the remaining criteria ensure that the data truly measures the real world.

The positivistic epistemology provides a logic and methodology for developing theoretical models capable of predicting project failures and identifying EWSs of failure, and thus helping reduce the instances of project failures. By reducing failures, organizations increase the benefits for stakeholders, which further maximizes their own likelihood of survival. The interpretivist philosophical foundation, on the other hand,

provides tools for answering questions about the meanings ascribed by people or researchers to their experiences, and to the words and deeds of other people. Since our research demands a logical approach that deals with reality beyond the lived experience of persons, the interpretivist epistemology would not be suitable for answering our research questions.

3.2. Qualitative-exploratory research

Our preliminary study of EWSs of failure employed a Delphi survey (Philip, Schwabe and Wende 2010) that established the relevance of team-level research for understanding failures in OOSD projects. That study could be termed a "quantitative-exploratory" (Stebbins 2001, figure 10) approach to the little-researched phenomenon of OOSD project failures; its aim was to obtain an overview of offshore failures. This preliminary quantitative exploration mainly identified communication and coordination issues as the EWSs that manifested before offshore project failures; in addition, it found that a research focus on the team level was relevant to efforts to avoid failures. We will not discuss the preliminary study (Philip, Schwabe and Wende 2010) in detail in this thesis.

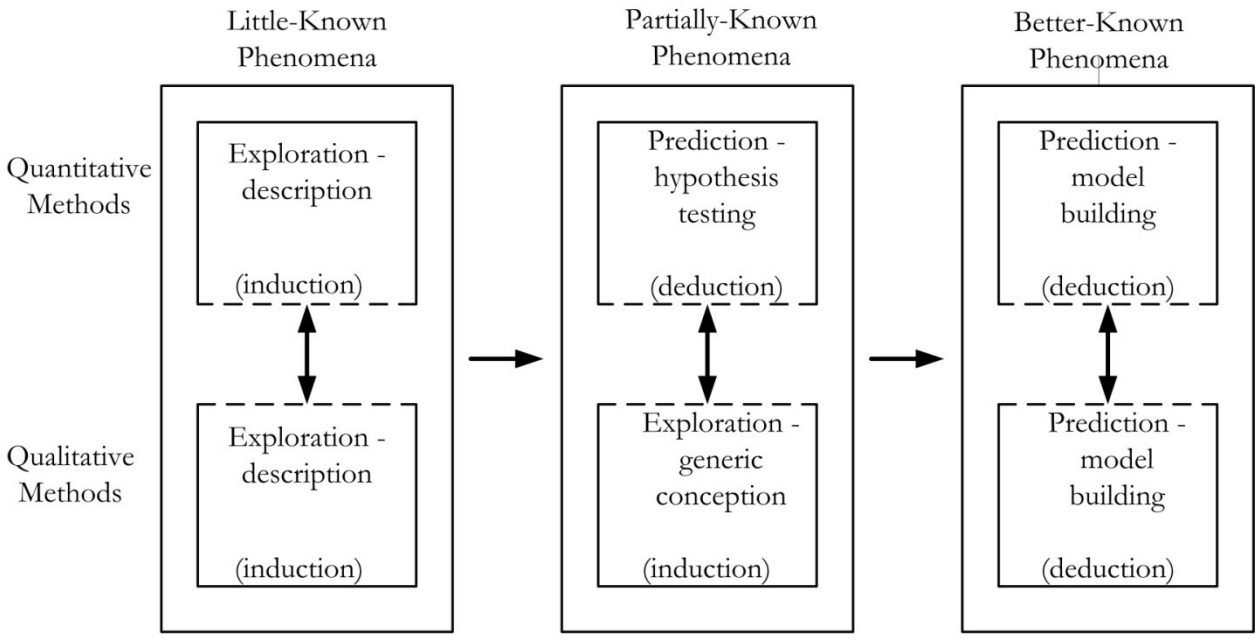

Figure 10: Phenomena and research methods (Stebbins 2001, p.7)

The present research, carried out after the preliminary quantitative study, can be termed "qualitative-exploratory" (Stebbins 2001); the in-depth investigation of team interactions that lead to failures in OOSD projects demands this approach. We study the onshore-offshore project environment in a qualitative way to offer theoretical conceptions regarding failures in OOSD projects. Based on Stebbin's (2001) framework of explorative research methods, we have moved from the little-known phenomenon of offshore project failures in the preliminary study (Philip, Schwabe and Wende 2010) towards the partially-known phenomenon of offshore-outsourced project failures in this thesis. We provide generic concepts for understanding OOSD project failures better; to some extent, we also offer a generic conceptualization of such failures.

Denzin and Lincoln (2005, p.3) define qualitative research as "a situated activity that locates the observer in the world. It consists of a set of interpretive, material practices that make the world visible." Using the practices and techniques of grounded theory, our aim has been to make the world of IS failures more visible. Further, Stebbins (2001, p. 3) defines exploration in social science as "a broad-ranging, purposive, systematic, prearranged undertaking designed to maximize the discovery of generalizations leading to description and understanding of an area of social or psychological life ... The emergent generalizations are many and varied; they include the descriptive facts, folk concepts, cultural artefacts, structural arrangements, social processes, and beliefs and belief systems normally found there." Variations in social structures, cultural dimensions, work processes, and belief systems among the client and vendor team members involved merit deeper analysis to answer the research questions. The IS discipline primarily employs social science methods to conduct research, and our qualitative exploration will put forth generalizations that describe the phenomenon of study in OOSD projects in a comprehensive enough manner to allow for predictions regarding factors leading to project failure.

3.3. Grounded theory

In IS research, the grounded theory method is widely used for qualitative studies, especially when the research is of an exploratory nature (Espinosa et al. 2007). This theory development approach was used as the general research method to answer our

research questions. It was the most appropriate method, considering the exploratory nature of the study as well as the sensitivity of failure research. This method of building theories through systematic collection and analysis of qualitative data was developed by Glaser and Strauss (1967). The extension of the original theory by Strauss and Corbin (1990) subsequently led to two different schools of grounded theory development – Glaserian and Straussian approaches. The former insists on grounding theories solely on collected data, whereas the latter allows a survey of the literature during the research process. We followed a Straussian approach (Corbin and Strauss 2008) to develop a theoretical account of OOSD project failures grounded in empirical data. We made extensive use of literature surveys before and after the data collection; this was necessary to situate the research in IS offshoring and failure research streams. Charmaz's (2005, p.509) analysis of the history of grounded theory in social sciences concludes that both approaches "draw upon objectivist assumptions founded in positivism," which further justifies our epistemological position.

Eisenhardt (1989b) identifies three distinct uses of theory for research: as an initial guide to designing the collection of data, as a part of an iterative process to collect and analyze data, and as the final product of research. Theories strive to explain and predict phenomena and provide causal relationships between them (Sutton and Staw 1995). Further, according to the taxonomy of theory types in IS provided by Gregor (2006), the four primary goals of theory include (1) analysis and description, (2) explanation, (3) prediction, and (4) prescription. Among these goals, our primary goal has been the prediction of project failures, especially in early project phases. Theories aimed at predicting the phenomenon of interest "states what will happen in the future if certain preconditions hold. The degree of certainty in the prediction is excepted to be only approximate or probabilistic in IS" (Gregor 2006, p. 618). It should be noted that project failures cannot be predicted with precision, as any external or internal factor could bring a project, which is a unique undertaking, to its downfall. Further, we concentrated on developing a practical theory that facilitates the application of knowledge to the profession of project managers. As noted by Van de Ven (1989, p. 486), "Good theory is practical precisely because it advances knowledge in a scientific discipline, guides research toward crucial questions, and enlightens the profession of management."

We develop testable propositions regarding the unique aspects that lead to project failures in OOSD projects, although we do not offer "well-developed justificatory causal explanations" (Gregor 2006, p. 619). Providing well-developed causality relationships between each construct (the domain of the theory of explanation) was not the prime objective of this research, since we aimed to provide prediction tools for project managers to help guide their actions as well as develop theoretical constructs regarding project failures and the EWSs of failure. In an exploratory field, developing a theory that could apply detecting EWSs of failure in order to predict project failure provides practicality and utility (Bacharach 1989) for project managers in terms of "what will be" (Gregor 2006) the situation in the future. However, we do provide explanations of project failures to some extent, and offer "a set of explanatory factors, without explaining the underlying causal connections between the dependent and independent variables" (Gregor 2006, p. 625). Our endeavor to identify the EWSs of failure and to seek the reasons behind the EWSs resulted in managerial tools for predicting project development in the onshore-offshore project environment. The EWSs of failure explain the general nature of relationship between the project issues and failures, without providing well-developed causal explanations among the constructs. Lack of data triangulation possibilities of failed projects through the counterparts in other organizations was the main reason for the failure to advance our study from "partially-known phenomenon" to "better-known phenomenon" (Stebbins 2001). If opportunities for case study research (Yin 2003) on project failures comprising both the client and vendor sides arise in the future, the improved qualitative data such research could provide might result in explanatory theories of project failures.

Several authors discuss the theoretical foundations of IT outsourcing (Dibbern et al. 2004; Busi and McIvor 2008; Lacity, Khan and Willcocks 2009). More than 20 prominent theories from various disciplines in social sciences have been used to explain IT outsourcing decisions and outcomes. Our research presents a managerial and theoretical perspective to help illuminate the relatively unexplored area of offshore-outsourced failures. We develop a substantive theory – in the sense of Gregor (2006), which

describes a substantive theory as a theory developed for specific areas of inquiry, like failures, divorce etc. – to predict the phenomenon of OOSD project failures.

3.4. Interviews

Qualitative research makes use of interviews as a data collection technique to "obtain a rich, in-depth experiential account of an event or episode in the life of the respondent" (Fontana and Frey 2000, p. 646). Structured, unstructured, or semi-structured interviews individually or in groups (Myers and Newman 2007) are the three general forms of interviews in social science research. Among these forms, the unstructured or semi-structured interview is the most common type used in IS qualitative research (Myers and Newman 2007). This interview type has an incomplete script and leaves room for improvising questions to obtain the rich details of OOSD projects. Clarification of specific issues by following up with questions was possible using the semi-structured interview type (Oshri, van Fenema and Kotlarsky 2008).

We followed the dramaturgical model suggested by Myers and Newmann (2007) as the basis for conducting interviews. In order to avoid the problems and pitfalls of qualitative interviews, Myers and Newmann (2007) use the drama metaphor for interviews and elaborate on the concepts of drama, stage, actor, audience, script, entry, and exit that improve the quality of interview performance.

In conducting the interviews, we used the interview guide approach described in (Myers 2008) – that is, we came to the interview with a set of open-ended questions that guided the interview, but allowed substantial flexibility for interaction with the interviewee and for follow-up questions. Although the interview guide is recommended only as an "emergency parachute" in the exploratory research context (Froschauer and Lueger 2003), where more unstructured approaches are generally preferred, we found that structuring the interviews using the understanding of the phenomenon gained through the literature survey provided a better focus for the research.

Esterberg (2002) notes that a qualitative interview could legitimately ask the interviewee to elaborate on the following aspects: their experiences or behaviours, their opinions or values, their feelings, their factual knowledge, their sensory experiences, and their personal background. In general, we have included three types of questions in the interview script (Myers 2008): team and project contexts, related project issues, and demographic questions. While the demographic questions elicited the personal background of the interviewees, team and project contexts as well as questions related to project issues elicited other legitimate themes such as interviewees' experiences, behaviours, opinions, or values, as well as factual knowledge, as suggested by Esterberg (2002).

The semi-structured interview questions that covered team and project contexts as well as project issues are listed in table 2. The interviewees were asked to narrate a major OOSD project failure and success in their career based on these interview questions. Because of the sensitivity of the topic, they were assured of anonymity during this research and we did not insist on project managers revealing the names of companies involved in the cases, though some interviewees revealed these details voluntarily. Questions #1 through #7 elicited the team and project context information about the narrated projects based on the interviewee's project experiences. Although we primarily analyzed project failures, question #1 was included to obtain a contrast between a project success and a project failure in the interviewees' careers. This question regarding the critical success factors of the most successful OOSD project in the interviewees' careers also acted as an entry question and set the field for the rather difficult questions regarding failures. Questions #2 through #7 dealt with the team and project contexts of a major OOSD project failure in the interviewee's career. These questions also provided background information about the questions regarding project issues that followed. We provided our definitions of project failure (cf. section 1.1) and project team (cf. section 4.1) to answer these questions.

#	**Interview questions**
1.	Could you please narrate the most successful OOSD project in your career? What were the critical success factors of that project?
2.	Could you please narrate a major OOSD project failure in your career? Please provide details such as original project objectives, human resources involved, duration and budget.
3.	Please provide details of the project set-up, such as countries involved, onshore-offshore work distribution, project management, and control of the failed project mentioned in question #2.
4.	Could you please talk more about the failure process of the project mentioned in question #2 in terms of important project episodes or as a chain of events that affected the project? Please provide a timeline of the important episodes or events in the project.
5.	Could you please generally discuss the team member interactions between the vendor and client of the project mentioned in question #2? Could you differentiate between formal and informal activities?
6.	How was the project team maintained throughout the failed project? How do you rate the performances of different teams onshore and offshore?
7.	Were there any changes regarding the project team interactions between the vendor and client from the project team perspective after the events mentioned in question #4?
8.	What do you think were the specific aspects of the OOSD project team that led to failure in the project mentioned in question #2? How was the team different from domestic outsourcing?
9.	Was there a single underlying aspect of the project team identified in question #8 that led to project failure? How were the other aspects related, if at all?
10.	Could you please identify the issues or indications of future issues (during the first 20% of the project's collaboration period between the client and vendor) that led to the project failure mentioned in question #2? Please elaborate the issues using examples from the project team perspective that were related to the following team modes:

	a. Inception mode, b. Problem-solving mode, c. Conflict resolution mode and d. Execution mode
11.	Can you think of other issues or indications of future issues (during the first 20% of the project's collaboration period between the client and vendor) that led to the project failure mentioned in question #2?
12.	Did you notice the problems mentioned in questions #10-#11 during the failed project? Could you please reflect how the management of those problems could have saved the project?
13.	Did the management of the identified problems that led to failure appear critical for the most successful OOSD project that you mentioned in question #1? If not, please reflect on this.

Table 2: Semi-structured interview questions

Questions #8 and #9 aided in answering research question #1 (cf. section 1.2), which concerns the unique team-level aspects that predict OOSD project failures. The literature survey regarding this question revealed research gaps between theory and empirical work on the offshore project context that predict failures. These open-ended questions aimed to provide material for filling that gap and specifically elicited the team-level aspects that predicted failures as well as the extent to which non-interactions among project team members result in failures.

The literature review to answer research question #2 revealed a clear lack of studies investigating the EWSs of failure in offshore-outsourced projects from the perspective of project managers, who are closer to the project than other stakeholders. Question #10 is based on the TIP theory (cf. section 2.2), which was used to understand the issues during the first 20% of the project's collaboration between the client and vendor. Different modes of the TIP theory (inception, problem-solving, conflict resolution, and execution modes) allowed the interviewees to differentiate and provide examples of varying issues during the failed project. Although it is not common to use existing theoretical frameworks to develop grounded theory, we used the TIP theory "as an overarching framework for the study" (Myers 2008, p.112) of EWSs. We further asked the open-

ended question #11 to identify other issues that cannot be categorized using the TIP theory modes. We identified and clustered (Miles and Huberman 1984) the EWSs of failure to understand the perception of EWSs by project managers.

The insufficiency of existing research to answer research question #3 regarding the management of EWSs of failure was addressed using the open-ended question #12, which prompted analysis of how the EWSs identified in the answer to research question #2 were managed during the project collaboration. Further, question #13 examined whether the identified EWSs were addressed in the most successful OOSD project in interviewee's career. The issues identified in failed projects were found to have been addressed in the successful projects, confirming that the analyzed project issues were worth studying and allowing us to draw a contrast between project success and failure.

The demographic questions listed in table 3 provide personal background about the interviewee and offer valuable hints about his or her competence and experience in dealing with OOSD projects. As the interviews are based on career experiences, details

#	**Demographic questions**
1.	What is your nationality?
2.	What is your age group bracket (age groups in 5 year brackets, e.g. 31-35, 36-40)?
3.	How many countries have you worked in?
4.	How many years of IT-related experience do you have?
5.	How many years of OOSD project experience do you have?
6.	How many years of project-management experience do you have?
7.	How many years of OOSD project-management experience do you have?
8.	How many OOSD project failures and successes have you experienced in your career?

Table 3: Demographic questions

like nationality, age-groups, work experiences, and number of failed and successful projects show the value of the data obtained through the interviews. In this thesis, we do not analyze the aspects related to nationalities, age-groups and countries where project managers worked, as they are beyond the scope of this work. The interviews we conducted were semi-structured expert interviews (Mayring 2002; Froschauer and Lueger 2003) that focused on experienced project managers based in Switzerland and India.

3.4.1. Interview partners

Since we studied failures from the project team perspective, we included experienced project managers (PM) from the client and vendor sides in our research. The inclusion of both sides was important, as they played equal roles for the outcome of offshore projects. Only PMs with at least two years of OOSD project management experience were requested to take part in the interviews. Client and vendor PMs were able to leverage their years of experience in OOSD projects and contribute to a better understanding of project failures.

We contacted PMs involved in offshore projects at major multinational organizations located in Switzerland and India as the key informants for interviews. They were chosen as interviewees since they were the "most knowledgeable and qualified" stakeholders involved in failed projects (Glick et al. 1990). We interviewed the initial contact persons and further asked them to recommend other PMs with possible experience of failed OOSD projects, a technique known as "snowballing" in qualitative research (Myers and Newman 2007). Altogether, we interviewed 42 PMs during the period from October 2011 to February 2012. However, we could only use 19 of these interviews (9 from the client and 10 from the vendor sides) for data analysis. The other 23 interviews could not be used for analysis, as those managers defined failure in a manner different from our definition; therefore, their project cases did not qualify for inclusion within our narrow failure definition. These latter interview cases came under the categories of challenged projects (Standish 1995), or nearshore projects within the same continent (Carmel and Abbott 2007).

The ratio of project managers who had experienced OOSD project failures (19 PMs) to project managers who had not (23 PMs) indicates that most real-world projects are completed. Most PMs had experience with projects that overshot their budget and timeline.

Table 4 offers background information about interviewees and shows the overall career experience of the project managers (from both the client and the vendor sides) whose interviews were included in our data analysis. On average, the client PMs interviewed had more IT-related, project management, and OOSD project management experience than the vendor PMs. The median value of OOSD project failures was 1 for both clients and vendors; however, the higher standard deviation of client PMs (11.22) compared to vendor PMs (1.37) could reflect the differences in the project context for clients and vendors.

	Clients	**Vendors**
No. of interviewed project managers	9	10
IT-related (average years)	16.56	15.22
OOSD project (average years)	8.33	9.56
Project management (average years)	11.11	8.56
OOSD project management (average years)	7.22	6.11
Median (standard deviation) of OOSD failures	1 (11.22)	1 (1.37)
Median (standard deviation) of OOSD successes	12 (21.02)	5.5 (16.08)

Table 4: Overall career experience of project managers

3.4.2. Interview cases

Table 5 provides an overview of the failed OOSD project cases[6] that were analyzed. It shows a summary of the countries involved in failed OOSD projects, the industry where the project was executed, and the cancellation phase during the project. All projects involved India as the offshore destination, and thus this study can be considered India-centric. The industries represented in the sample include banking, air transport, power generation, public sector, automotive, and insurance. The research could be equally applied to all industries involved in OOSD projects, although some financial industries such as banking could be considered more information-intensive than others.

Interview cases	Countries involved	Industry	Cancellation phase
A	Germany, India, Switzerland	Power generation	Integration and testing
B	India, Switzerland	Banking	Integration and testing
C	India, Switzerland	Insurance	Integration and testing
D	India, Switzerland	Banking	Integration and testing
E	India, Switzerland	Banking	Integration and testing
F	India, Switzerland	Insurance	Requirement analysis
G	India, Switzerland	Banking	Integration and testing
H	India, Singapore, Switzerland	Banking	Integration and testing
I	India, Switzerland	Air transport	Integration and testing

[6] The terms "project cases," "interview cases," and "cases" are used interchangeably in this thesis. Please note that they should not be confused with case studies.

J	Germany, India, Switzerland	Insurance	Integration and testing
K	India, Switzerland	Banking	Integration and testing
L	India, USA	Automotive	Integration and testing
M	India, Switzerland, USA	Insurance	Requirement analysis
N	Germany, India, Switzerland	Public sector	Integration and testing
O	Germany, India	Automotive	Integration and testing
P	India, Switzerland	Public sector	Integration and testing
Q	India, Switzerland	Insurance	Integration and testing
R	India, Switzerland	Air transport	Integration and testing
S	India, Canada, Switzerland	Insurance	Requirement analysis

Table 5: Failed project cases

All project cancellations described in the interviews happened during the last 10 years. In terms of methodologies applied, only project case Q used agile methodology; the rest were executed using the waterfall model. The typical phases of an OOSD project encompass requirement analysis, design, coding, and integration and testing. Most of the projects limped along all the way to the integration and testing phase, where the final decision of project cancellation was taken. The cancellation took place earlier only in project cases F, M, and S; these were cancelled during the requirement and analysis phase,

where the lack of business benefits and project management capabilities were noted early during the execution.

3.5. Qualitative data analysis

The techniques we applied for analyzing qualitative data included the analysis of memos, series of events, critical incidents, content analysis, and inductive analysis (Myers 2008). Once the theoretical saturation of categories and concepts was reached as required by the grounded theory approach (Corbin and Strauss 2008), we limited our inquiry to 19 project cases. The average interview duration was around 1 hour. The interviews were recorded on tape and subsequently transcribed, resulting in a total of 255 pages of text. The interview text was sent to the interviewees for validation.

We wrote memos for each emerged concept, which were analyzed further for developing categories. Content analysis allowed us to make sense of the events, issues, and situations that were instrumental to project failures. According to Patton (2002, p. 381), content analysis involves "the process of identifying, coding, and categorizing the primary patterns in the data." Open and axial coding schemes (Boyatzis 1998; Corbin and Strauss 2008) were employed to build thematic categories of data and to understand the relationships between the emerging concepts and categories. Open coding was employed in the initial analysis to delineate concepts from the data. Then, we used axial coding to relate the emerged concepts to each other; in total, we had 91 concepts. We then applied inductive analysis in order to understand the patterns and relationships between concepts. Patton (2002, p. 390) notes that in inductive analysis "the patterns, themes, and categories of analysis come from the data; they emerge out of the data rather than being imposed on them prior to data collection and analysis."

We employed the MAXQDA 10 software for data coding and analysis. The emerged concepts were combined to develop theoretical predications about failures in the early stages of OOSD projects. The process of developing theoretical constructs (Lee and Baskerville 2003) regarding EWSs of failure and OOSD projects was far from easy, which could also explain the fact that so far little extensive research has been undertaken into OOSD projects and failures.

The categories that we constructed on the basis of the concepts were subsumed into general ones from the particulars (Miles and Huberman 1984), so as to enable the development of theoretical constructs. We clustered categories (Miles and Huberman 1984) and employed Lee and Baskerville's (2003) generalizability framework to make qualitative generalizations about emerging concepts. As the complex nature of project failures makes statistical generalization difficult (Lyytinen and Hirschheim 1987), our qualitative data analysis mainly looked for generalizations from empirical observations to theoretical statements. Among the four types of generalizations classified by Lee and Baskerville (2003, see table 6), we generalized from empirical statements culled from interviews to theoretical statements – that is, we used the data gathered through the interviews in the development of theoretical constructs. We also synthesized empirical statements from the literature to other (more general) empirical statements, and generalized from theoretical statements (e.g., TIP theory) to empirical statements.

	Generalizing to Empirical statements	**Generalizing to Theoretical statements**
Generalizing from Empirical statements	EE – Generalizing from data to description This involves generalizing data to a measurement, observation, or other description.	ET – Generalizing from description to theory This involves generalizing measurement, observation or other description to a theory.
Generalizing from Theoretical statements	TE – Generalizing from theory to description This involves generalizing a theory, confirmed in one setting, to descriptions of other settings.	TT – Generalizing from concepts to theory This involves generalizing a variable, construct, or other concept to a theory.

Table 6: Generalizability framework (adapted from Lee and Baskerville 2003, p. 233)

The known as well as emerging concepts were further confirmed and validated against the extant literature to relate our study to the empirical and theoretical findings in the

research area (Corbin and Strauss 2008). This adds to the plausibility of our research findings by providing theoretical coherence (Miles and Huberman 1984).

4. Unique aspects of OOSD project failures

4.1. Introduction

The higher risks involved in OOSD projects make them more difficult to manage than domestic outsourcing projects. The literature on IT outsourcing provides some insight into the factors that make these projects more challenging. However, empirical research on project failures has been too scant in IT outsourcing to offer a concrete diagnosis of the specific aspects that predict project failures. Several project teams[7] are involved in the development of software at the onshore and offshore locations. Especially in multi-national corporations, the organizational set-ups can be very complicated to coordinate between the teams involved, as the teams are located in several countries. In OOSD projects, two or more teams work together from different onshore and offshore locations to achieve the project objectives (Oshri, Kotlarsky and Willcocks 2009).

OOSD projects are globally distributed projects that involve team members from vendors and clients working at onshore and offshore sites (figure 11). Typically, three different subteams will be involved in such projects, namely, client onshore, vendor onshore, and vendor offshore subteams.[8] Except within the same location, the teams work as virtual units. Instead of working as a single team unit like in in-house projects – or often in captive offshoring (same organization) as well – offshore-outsourced projects involve three loosely connected subteams that work for a common objective. Each subteam has its own leads, who usually act as primary interfaces between teams. The vendor offshore and onshore teams mostly come from sub-units in the global organization, with project leads having multiple responsibilities and fulfilling "linking pin" functions in organizational charts (Likert 1967).

[7] The terms "groups" and "teams" are used interchangeably in this thesis. Academic literature from sociology, organizational science, and psychology tends to use the word "group" as opposed to popular management and IS literature that uses the word "team" (Cohen and Bailey 1997).

[8] Since client and vendor onshore team members mostly work at the onshore site, they will be collectively referred to as "onshore teams" in this chapter. The vendor offshore team will be referred to as the "offshore team." OOSD projects can also have client members distributed across the globe within the same organization.

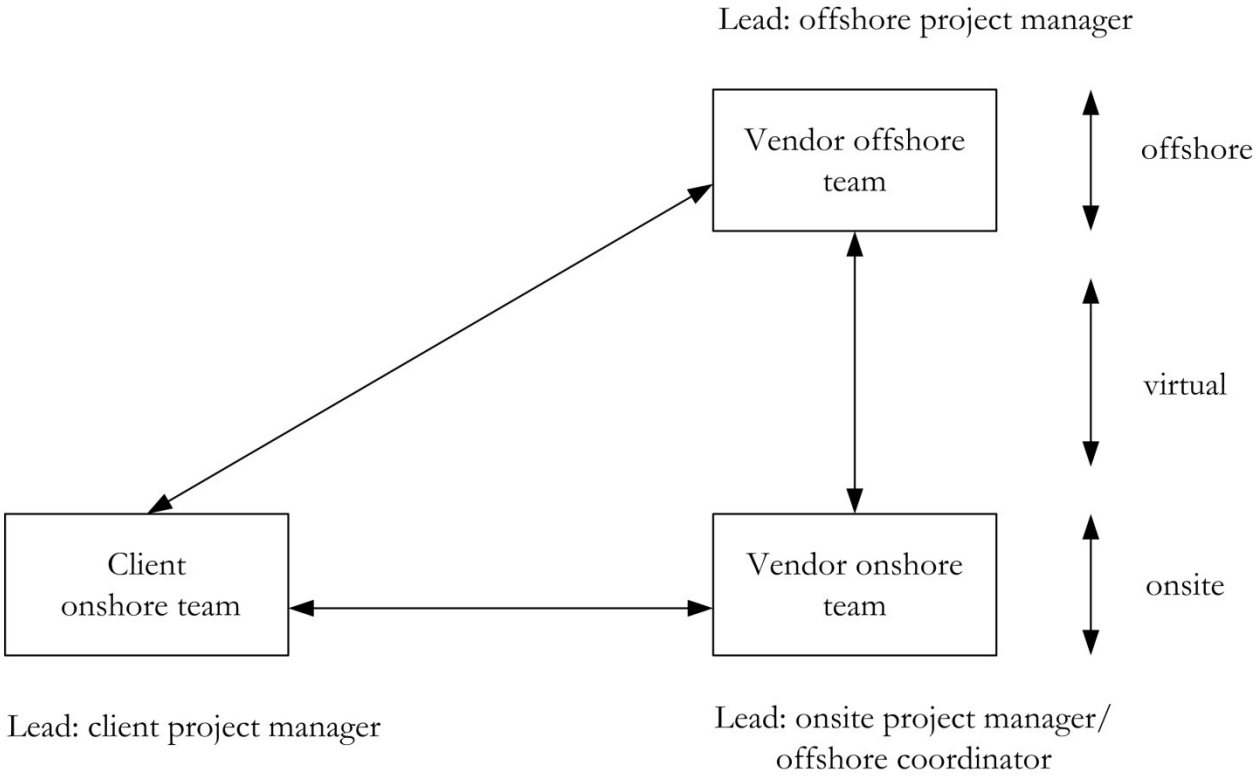

Figure 11: OOSD project team

In this work, we define *OOSD project team* as a group of team members comprising members from subteams[9] in two or more organizations from different countries, working together to accomplish a common project objective. In the IT outsourcing context, the project objective is the development of the information system contracted by the client and guided by the client's organizational objective. Onshore and offshore teams are responsible for mostly interdependent tasks, and the challenge in the offshore context is to integrate different teams into a single project team. The organizational team setup at the vendor side, with its onshore and offshore teams, exacerbates the complexity of coordination activities in OOSD projects. The IS outsourcing context involves boundary-spanning activities across organizations and nations. The project team is embedded in the inter-organizational and multi-national environments (figure 12) and these environments set the "conditions under which group interaction takes place" (McGrath 1984, p. 14).

[9] We use the terms "teams" and "subteams" interchangeably in this thesis. The term "project team" is used to refer to the integrated unit of subteams in all locations, whereas "teams" and "subteams" are referred to subteams at onshore or offshore locations.

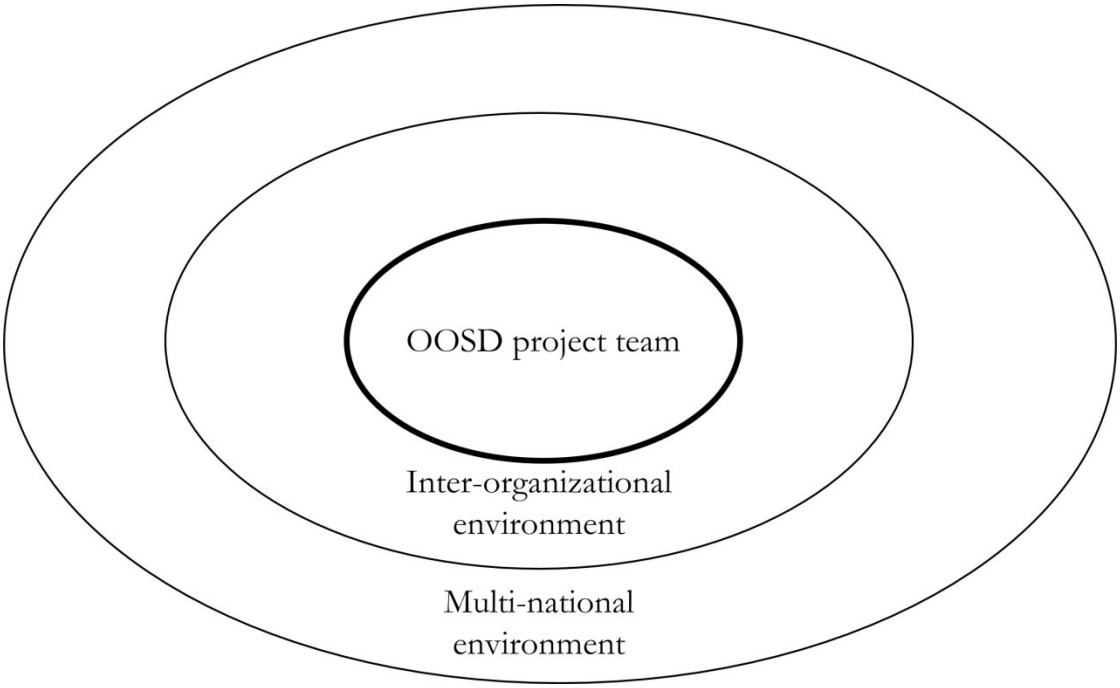

Figure 12: OOSD team embedment

According to Carmel (1999), the loss of "teamness" in dispersed teams affects the performance of global projects. Most social science and IS research has concerned co-located or captive teams and there exists little solid research on the dynamics in OOSD project teams that predicts project failures (Lacity et al. 2010; Hinds, Liu and Lyon 2011). The failure to work together as a single project team is an area that calls for extensive research in IT outsourcing. In this chapter, we analyze the project context (Corbin and Strauss 2008) that could predict failures in OOSD projects. We investigate, in an exploratory manner, the unique characteristics of project teams in OOSD projects as well as the team member (non)interactions that predict project failures[10].

To reiterate the research question formulated in chapter 1:

Which unique team-level aspects of offshore-outsourced software development projects predict failures and how do they predict failures?

[10] Parts of this chapter have been published earlier in (Philip, Wende and Schwabe 2012) and (Philip, Wende and Schwabe 2013b).

4.2. Unique failure-predicting aspects of OOSD projects

The qualitative analysis of empirical data (cf. section 3.5) resulted in the identification of distinct patterns of team-level aspects that predict project failures. Six general categories of project aspects that help predict project failures at the team level emerged by subsuming particular characteristics into more general categories (Miles and Huberman 1984). They include both offshore-specific and non-offshore specific aspects (Philip, Wende and Schwabe 2012). *Offshore-specific aspects* are unique to OOSD projects and require special attention. They are: project team-building efforts, team collaboration, awareness of shared work context, and onshore-offshore team coordination. *Non-offshore specific aspects* are not unique to OOSD projects, but in order to overcome the disadvantages caused by the offshore environment, they require more attention in that environment than in domestic software outsourcing projects. They include shared project execution structures and team member competencies.

We further differentiated the emerged categories into three higher-level categories that affect team performance: team initiation, team interactions, and team moderators. Team initiation efforts build up the OOSD project team and include the aspects of setting up of shared project structures and team-building efforts. The initiation influences subsequent team interactions, which are manifested in the collaboration between teams and the awareness of shared work context among onshore and offshore teams. Furthermore, the category of team moderators influences team development and performance by influencing, throughout the life of the OOSD project, the other team development categories, namely, team initiation and team interactions.

After the identification of those aspects of the functioning of project teams that predict failures, we reconciled them with the extant literature, which we discuss in the sections below. Some of the characteristics or factors contributing to failures that emerged in our exploratory research were prominently noted in the literature, although those researchers did not focus on failures. We further developed theoretical propositions to predict project failures based on our exploration as well as on literature on partially-known

phenomena (Stebbins 2001) related to failures. Please note that section 3.4.2 provides an overview of the project cases that are referenced in this work.

4.2.1. Team initiation

4.2.1.1. Project team-building efforts

Failure to build a functioning project team by integrating team members from the client and vendor organizations may be an indication that the project is heading toward a failing direction. The onshore vendor project manager of case P remarked the following about the team-building exercise among dispersed team members and the barriers that led to failures: "You cannot ignore the status of team building. And if you start to ignore it, even if we have methods, even if we have processes, we are running a project. We are not doing business as usual. It's not something that has a clear input and a clear output. … And there I need to have a very high focus on team building. And as more of my team is distributed, the more I need to take care of our team building." The integration of individual talents (Curtis, Krasner and Iscoe 1988) in different locations into a single project team is required in OOSD projects.

OOSD projects mostly experience "semi-virtual" interactions, in which selected team members get the chance to visit their colleagues onsite or offshore. However, Oshri, Kotlarsky and Willcocks (2009) note that such meetings are short, formal and sporadic in nature, which hinders the development of social ties. The lack of social ties and opportunities to openly discuss project matters was found to affect the bonding and rapport among the team members, in accordance with the findings of Kotlarsky and Oshri (2005). As the project manager of case D remarked: "There was a lot of interaction but as you can see through the corrective measures, one member once said, 'I need to be able to look the people I am working with in the eye.' When you have a video conference or a telephone conference, they heard what the other party said but they never had a team-building off the context of the professional element, or always just a personal relationship to the others."

Team cohesion has been known to be a factor that predicts improved project performance (Bettenhausen 1991). Hofstede (1984) identified individualism/collectivism

as one of the cultural dimensions that varies at the national level. Collectivism refers to a sense of being part of the collective group that is embedded in a social and cultural setting. Most Asian nations rank high in this dimension, whereas Western countries were found to have an individualistic outlook. Bochner and Hesketh (1994) found empirical support that teams that are high on collectivism put more emphasis on group performance and recognition. Further, Gibson (1999) found that the level of collectivism moderates the positive relationship between team efficacy and team effectiveness. However, in another quantitative team study, Eby and Dobbins (1997) found no direct links between team collectivism and team performance; rather than by collectivism, performance was determined by the willingness of teams to cooperate.

We found that the lack of a shared sense of identity within the project team affected the outcome in failed projects. The establishment of a shared identity among the dispersed teams has proved crucial to establishing a functioning project team. MacDuffie (2007, p. 569) defines shared identity as "the degree of commonality in perceiving oneself as a member of an established and esteemed in-group with a particular identity, set of values, norms, and routines." Mostly, the vendor offshore team could be viewed as the out-group in the project team since they are far from the action and depend on the transfer of knowledge from onshore to work effectively. For instance, in project case N, the vendor offshore team was given the specifications for the software to be developed without any context information, and was simply expected to deliver to the onshore team. The vendor onshore project manager of case N agreed that the vendor onshore team could not identify with the offshore team and even questions from offshore were blocked by the onshore team members. The table 7 provides an overview of the development phases in an OOSD project with the sites and typical teams involved from project cases. Although team composition can vary depending on task complexity and familiarity, vendor offshore team members cannot always follow the relevant social and non-verbal cues that could smooth collaboration between team members. Most teams will be involved in the various development stages, except for the coding and the maintenance phases, where the vendor team members mostly work independently.

Development phases	Sites	Teams
Requirement analysis	Onshore, offshore	Client onshore, vendor onshore, vendor offshore
Design	Onshore, offshore	Client onshore, vendor onshore, vendor offshore
Coding	Offshore	Vendor offshore
Integration and testing	Onshore, offshore	Client onshore, Vendor onshore, vendor offshore
Maintenance	Offshore	Vendor offshore

Table 7: Typical OOSD phases and team involvements

Furthermore, new team members could be introduced into the project team at any phase of the project, which points to the necessity for mechanisms to help new team members feel part of the project team. Also in projects P and O, the offshore team members did not feel part of the project team because of the lack of team-building measures between the onshore and offshore teams. This hindered the development of the trust and rapport that are required to offset the differences in national and organizational work practices that exist between the teams.

The TIP theory holds that all team members work together as an integrated team in the execution mode (McGrath 1991), a scenario that was missing in failed OOSD projects. The client, vendor onshore, and vendor offshore teams need to develop a shared identity to improve team cohesiveness and thus team performance. In order to emphasize the integrated nature of the offshore and onshore teams, we formulate the following proposition.

Proposition 1: Shared identity within the project team comprising offshore and onshore teams will reduce the likelihood of project failure in OOSD projects.

4.2.1.2. Shared project execution structures

The lack of a shared understanding regarding project execution among onshore and offshore team members results in projects not being completed according to the original project objectives. The geographical and cultural distance entails the need for mutually agreed-upon project structures to avoid failures. The vendor onshore manager of case K noted the necessity of structures in OOSD projects as follows: "You might have a maverick pulling the project through, but if you don't have a structure for offshore projects, you will not succeed. And offshore [project] requires that to be done." A lack of shared project structures and the consequent divergent expectations among team members on different sites result from varying organizational and professional practices. Key project structures include scope formulation, requirement specifications, approvals, communication, documentation, tracking, and roles and responsibility assignment; all these require more formality in the absence of direct meeting possibilities. Formal structures will compensate for the social cues that are left out in a semi-virtual working environment. For example, the project in case F had to be cancelled in the requirement analysis phase as the project scope kept changing and the insecurity surrounding the execution of such a project offshore was high. Similarly, the client project manager of case M noted that the scope change of internal projects was still possible, whereas with outsourcing arrangements, the changes proved very difficult.

According to the TIP theory, projects with ill-defined processes will spend more time in problem-solving and conflict resolution modes (McGrath 1991). The lack of co-located work possibilities demands that project structures be defined in an unambiguous manner. The formulation of project structures at the outset of the OOSD project allows the project to spend most of the time in the execution mode. The standardization of work processes, tools and systems (Hinds and Mortensen 2005) might also reduce the difficulties caused by perceived physical distance between the onshore and offshore teams. As the opportunities for face-to-face informal communication become rare for the project team, the additional formal structures that are shared by clients and vendors will offer fewer confrontation possibilities.

Ramasubbu et al.'s (2008) work regarding offshore software development performance indicates that structured processes could mitigate the negative effects of work dispersion between teams. Unlike structured processes like CMM processes, we found that having mutually accepted structures (Sakthivel 2007) and expectations about the project management processes (Rottman and Lacity 2008) are crucial for the outcome. Karahanna et al. (2005) assert that organizational and professional cultures will dominate over national cultural traits in team behaviors that involve strong task components or work practices (cf. (Hofstede 1984)). Similarly, Earley and Mosakowski (2000, p. 26) found that virtual teams in multinational organizations develop a hybrid team culture over time, which they define as "an emergent and simplified set of rules, norms, expectations, and roles that team members share and "enact.""

Furthermore, Brannen and Salk (2000) report the development of a "negotiated culture" that could be a mutation of different team cultures, rather than one organizational culture clearly dominating the other by establishing its work practices in the project. Team work practices that are emergent or negotiated need to be mutually accepted and understood. Such a shared understanding of project structures and expectations forms the fundamental basis for executing offshore projects. MacDuffie (2007, p. 569) define shared understanding as "the degree of cognitive overlap and commonality in beliefs, expectations, and perceptions about goals, tasks, processes, and members' knowledge, skills, and abilities." The lack of a shared understanding of project structures between the onshore and offshore teams could lead to project failures. We formulate the following proposition regarding shared project structures in OOSD projects, where the organizational and work practice differences cause various perceptions of project activities.

Proposition 2: A shared understanding of project structures between onshore and offshore teams will reduce the likelihood of project failure in OOSD projects.

4.2.2. Team interactions

4.2.2.1. Collaboration between teams

Onshore and offshore team members interact with each other intensively to develop information systems. This requires adaptation to the onshore-offshore project environment. The requirement specification, in particular, is a collaborative activity that requires intensive communication (Edwards and Sridhar 2005). The heterogeneity of teams in different locations requires a shared understanding of the team's collaborating mechanism (Gibson and Zellmer-Bruhn 2001). Kotlarsky and Oshri (2005, p. 40) define collaboration as a multi-dimensional process that involves "constructs such as coordination, communication, meaning, relationships, trust and structure."

The onshore vendor project manager of case Q remarked that any information transmitted through communication is relative: "Any kind of language, either written or spoken, is subjective, not objective." If communication is to provide a basis for effective collaboration, information needs to be conveyed and converged (Dennis, Fuller and Valacich 2008) to ensure that the distant offshore team members understand the semantics in a manner compatible with that of the onshore actors. The onshore vendor project manager of case P noted the following regarding the challenges in collaboration and sharing project context: "There is a barrier in communication. I cannot look into the eyes of the other one, I cannot hear the kind of volume and melody his voice is making or her voice is making. I cannot really ask questions." Nevertheless, he maintained that increased interactions, especially face-to-face ones, made people feel a part of the project team: "When people travel here and then back, after a couple of months they were behaving as one team. But, as I said, the people, it was not a bottleneck, the process was a bottleneck." However, as Oshri, Kotlarsky and Willcocks (2009) note, face-to-face meetings are events that are too rare to sustain effective communication in OOSD projects.

The deployment of appropriate communication media plays an important role in improving collaboration among onshore and offshore actors (Wende, Schwabe and Philip 2010). How the team members on the opposite sides of the onshore/offshore divide perceive each other depends on a combination of formal and informal

communication measures over time. Depending on the interdependency and complexity of tasks, asynchronous media like e-mail and documents, or synchronous media like chat, telephone, videoconferencing, and face-to-face communications can be deployed to execute necessary tasks (including generation of ideas and plans, intellectual tasks, judgment tasks and negotiation of conflicts of interests (Hollingshead, McGrath and O'Connor 1993)). The social cues, information richness, and distractions of media will determine the effectiveness of the media to execute the tasks (Daft and Lengel 1986; Hollingshead, McGrath and O'Connor 1993). Short, Williams and Christie (1976) note that face-to-face meetings will improve the social perception of the other side. However, such meetings between team members from both the vendor and client happen only occasionally in OOSD projects. The use of asynchronous communication in the virtual team context puts an end to the formal social control in co-located teams such as direct supervision and social trust (Montoya-Weiss, Massey and Song 2001). Lee-Kelley, Crossman and Cannings' (2004, p. 656) study of virtual teams found that an "asynchronous communication process converts a two-way dialogue into a two-way monologue, which can create issues of attributing meanings." Instances of informal spontaneous communication[11] (like water-cooler or corridor talk) that can improve collaboration by reducing conflicts and friction in the information flow are as rare as face-to-face meetings in OOSD projects.

An aberration that we found resulted from the optimization of project resources was the missing collaboration between client onshore and vendor offshore teams. This reduced the information intensity that reached the vendor offshore team. Figure 13 depicts the situation experienced by the vendor project manager of case N that led to project failure. The communication direction in the project was set up without involving the offshore team members. The vendor onshore team acted as a facilitator between the client and vendor offshore teams, and so the vendor offshore members only knew about the

[11] Hinds and Mortensen (2005, p. 293) describe spontaneous communication as "informal, unplanned interactions that occur among team members."

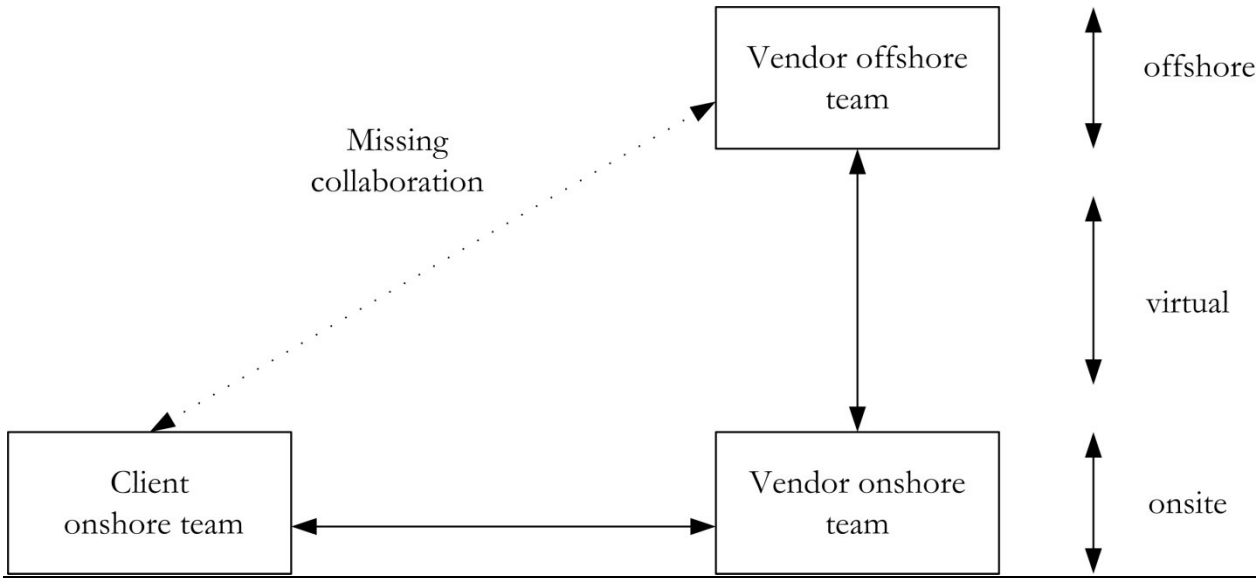

Figure 13: Collaboration setup

explicitly formulated information about the project, which was not rich in content, and missed the tacit and idiosyncratic details. As knowledge of European social security systems was necessary for the completion of the project and as the vendor offshore members did not possess such knowledge, they were unable to provide the expected deliverables. The same scenario was repeated in case I: no offshore team member was involved in direct communication with the client. That was the main reason for the failure of the project – the offshore members did not understand the project requirements completely since the documented requirements were not explicit enough for the Indian developers to comprehend.

The offshore vendor project manager of project case O noted the disregard of the offshore team that led to the breakdown of collaboration: "That complete lack of collaboration and communication and collaboration at the team member level and communication at the management level [were the aspects leading to failure]. There was no communication… The communication should have been much more frequent, much more strong, more ad hoc also at times, but it was not. There was no respect for the offshore team, I would say. It's difficult for me to tell that, but at times I feel that they don't care about the offshore project team, especially the offshore project manager, would like to talk to them. That was another reason. The reason why what happened is

that because of lack of communication the offshore project manager was not able to direct his team in the right direction. He himself was directionless." The absence of a direct communication channel can affect the quality of teamwork by consuming more time and acting as a source of faulty information exchange (Hoegl and Gemuenden 2001). Buchan, Croson and Dawes (2002) found that cooperation decreases with increased social distance – a characterization that applies to the OOSD project context – and thus the trust level will also be lower in indirect-exchange conditions than in direct-exchange conditions. Furthermore, Metiu's (2006) study of distributed captive groups has shown that the main problem in collaborating across borders lies in the teams' lack of desire to work in a cooperative manner, not in the sophistication of communication tools. This becomes relevant as the vendor organizations are in a sense multi-national software development organizations with captive centers in onshore or offshore locations.

Information intensity will be reduced with the intervention of facilitators located onshore, and so the vendor offshore members need to have a presence onshore to capture the missing bits and bytes relevant to the development. The collaboration level is also affected by the organizational culture and geographic distance between onshore and offshore teams that lead to information asymmetries between them. The lack of involvement from the vendor offshore team in the collaboration setup will result in the loss of tacit, embedded, and encultured knowledge required for the software development, which could prolong the project timeline and overshoot the budget. The following proposition captures the nuances lost in OOSD project collaboration leading to failures.

Proposition 3: Direct collaboration between vendor offshore and client onshore teams will reduce the likelihood of project failure in OOSD projects.

4.2.2.2. Awareness of shared work context

Team initiation efforts can lead to interactions between onshore and offshore teams that may further develop into an awareness of onshore-offshore work context. This emerging state, shared among team members, requires the combined efforts of offshore and

onshore project managers. The client project manager of case B noted the lack of awareness of shared work context: "Because it [work context] is different and it is not a question of bad and good, it is different. And if you are not aware enough of this issue then you could not solve it." The client manager expected the vendor onshore and offshore organizations to manage the local contextual work differences between them; however, the vendor teams did not collaborate intensively enough to allow each side to become aware of the shared project work context.

Differences in national and organizational cultures hinder the development of shared awareness among onshore and offshore teams. The onshore vendor project manager of case K remarked the following about the impact of culture on collaborative work: "Collaboration is … something which is different for different cultures. So you have to adapt to the needs of different cultures. For example, the Swiss are very, very people oriented. They would like to see the team. So organizing video conferences … being able to see the person face to face, by organizing visits where the customer team goes to offshore to meet the project team, interacts with them, or even virtual parties."

Several researchers address team presence and the activities that provide context to team members. Short, Williams and Christie (1976, p. 65) define the construct of social presence as "the degree of salience of the other person in the interaction and the consequent salience of the interpersonal relationships," which explains how individuals or teams are perceived to be present in the medium by other individuals or teams. How a team's social presence is perceived depends on the capacity of the medium to "transmit information about facial expression, direction of looking, posture, dress and non-verbal vocal cues" (Short, Williams and Christie 1976, p. 65). Face-to-face interactions are perceived to have the highest social presence compared to lean media such as e-mail, which has fewer social cues and also a low social presence. A higher social presence also contributes to greater awareness of the shared work context. However, in OOSD projects face-to-face interactions are limited to a few selected team members.

Apart from having an optimal social presence, the lack of awareness regarding each other's cultural context can hamper team interactions between vendor and client teams.

A lack of cultural sensitivity or respect for the offshore team can lead to an exodus of offshore team members, as the onshore client project manager of case L experienced. This US project manager's rigid and hard-hitting communication style offended and demotivated the Indian team members, and most of the team members eventually left the company, leading to the cancellation of the project.

We found, however, that the effects of cultural distance between onshore and offshore teams diminished or even disappeared over time in teams that invested sufficient effort in team-building. The client project manager of project case F found that: "With the time, with the experience you get that [culture] factor under control and it doesn't play a role anymore today. Because people know how the culture works and how to interact best." The client project manager of case M had this to say about the development of cultural sensitivities: "It doesn't really matter where they come from as long as you understand where they come from and accept any differences of culture. So I would say it doesn't really matter who you are working together with as long as you do it on a respectful way." National cultural dimensions were found to be less relevant when team members invest effort in cooperating. As Karahanna, Evaristo and Srite (2005) note, the work practices established within the team trump underlying national values.

Nevertheless, the absence of social cues and the breakdown of social constraints in the mostly virtual collaboration during offshore software development can lead to a loss of shared context. Team members can find themselves in a state of deindividuation (Lea and Spears 1991), in which dispersion can result in low accountability, self-awareness and reduced feelings such as empathy, embarrassment, and guilt (Diener 1979; Siegel et al. 1986). Montoya-Weiss, Massey and Song (2001) found that the use of asynchronous communication in the virtual team context prevented shared experience among team members, although shared experience is usually present in co-located software development. On the other hand, Hollingshead, McGrath and O'Connor's (1993) research found that intellectual tasks (such as software development) are not necessarily performed better in face-to-face situations than in virtual ones.

Dourish and Bellotti (1992) studied the need for team members to be aware of how their activities and presence provide context to other members. In the distributed project collaboration, the onshore team's awareness of the presence and activities of the offshore team members, and vice versa, played a role in transferring knowledge effectively. The diversity of local contexts further exacerbates the transfer of embedded and local knowledge between sites (Oshri, van Fenema and Kotlarsky 2008). Damian and Zowghi (2003a) found that reduced awareness of the local context can affect the requirement analysis negotiations in the early project stages. Similarly, Hinds and Mortensen (2005) found that if virtual teams shared a work context, that could help moderate the relationship between interpersonal conflicts and distribution as teams could make better sense of team member behaviors. They define shared context as a state "when team members have access to the same information and share the same tools, work processes, and work cultures" (p.293).

Baba et al. (2004, p. 551) argue that knowledge sharing between teams leads to a process called cognitive convergence ("team members gradually enhance the degree of overlap or similarity among their cognitive structures") that can improve virtual team performance. Further, they contend that higher interdependencies between teams, as well as greater task complexity, call for intensive interaction between teams to improve shared understanding. Dispersed collaboration leads to a failure to communicate contextual information, which in turn results in a lack of mutual contextual awareness. Cramton (2001) notes that the failure to convey contextual information hinders the development of mutual knowledge.

We found that the level of awareness of the shared work context that team members possessed is relevant to establishing a common understanding. We formulate the following proposition to capture the significance of the shared work context during collaboration in OOSD projects.

Proposition 4: A strong emphasis on fostering a shared work context between onshore and offshore team members will reduce the likelihood of project failure in OOSD projects.

4.2.3. Team moderators

4.2.3.1. Team member competencies

Project team member competencies in the requisite competence areas of OOSD projects – ranging from technical, communication, and domain knowledge – improve project performance. Lacking these competencies can result in staffing issues in domestic outsourcing projects as well, but this problem becomes more pronounced in the Indian context, where market forces play a big role in high turnover of employees (Sidhu and Volberda 2011) and the available human resources in projects. Several vendors complained about the unavailability of the promised resources in the project, which later led to disappointments. The vendor project manager of case Q found that the domain knowledge competencies of the Indian developers were not adequate for the insurance domain and described the difficult situation as follows: "So the fact that they were distant, very distant from the onshore action that was stuck in this cyclical, political game, and that they didn't have a great deal of expertise in doing what they're being asked to do certainly created an environment where this team of people were very, very eager to do what they were being asked to do but could not see the inherent challenges that made it almost impossible to do what they were being asked to do. So they were these offshore guys who kept rolling the rock up the hill and then watching it tumble down again every night. Without stopping and being able to say, 'There's a bloody good reason for this.' "

The client project manager of project case A, which was about developing a business intelligence system, remarked the following about the competency of available resources: "The provider didn't tell us at that point of time that they did not have many people on this, like really trained on this tool. So the provider assumed that, like it happens in many offshore projects that I've seen, that thought that people could learn on the job and then deliver, but basically since the requirements were complex and there were so many kinds of communication issues this did not happen and they got exposed basically." The offshore team members also lacked the communication competency to interact with the client project manager in an unambiguous manner, which led to project slippages and eventually the decision to abandon the project.

As team members in the semi-virtual work environment add more overhead in the project, the teams involved need to be aware of the missing verbal and non-verbal cues in communication. Acquiring offshore capability in terms of synchronous and asynchronous communication facilitates project execution. For tasks that demand negotiation, information-rich communication media (Daft and Lengel 1986; Hollingshead, McGrath and O'Connor 1993) could be used to compensate for the social cues that may be lost as a result of the cultural and physical distances between teams.

Technical and domain-specific knowledge have been identified as critical for offshore software project outcome (Rottman and Lacity 2006; Iacovou and Nakatsu 2008). Balaji and Ahuja (2005) have suggested the integration of external and internal knowledge within the team as critical for project success. Project team competencies are mainly addressed during the initiation phase of the project (McGrath 1991). This team moderating aspect needs to be addressed by both onshore and offshore team project managers by choosing skilled and cooperative project members who enhance the team. The agency theory notes the risk of adverse selection of team members, which explains the missing team member competencies. Adverse selection refers to "the misrepresentation of ability by the agent" (Eisenhardt 1989a, p. 61). The inability of the actors to observe each others' behavior could be solved by outcome-based contracts that specify concrete deliverables, in which both sides assume responsibility for respective competencies. As the agency theory offers elegant explanations regarding the missing team member competencies in OOSD projects, we do not formulate any propositions here.

4.2.3.2. Onshore-offshore team coordination

Organizational capacity (Amit and Schoemaker 1993) and contextual knowledge (Klakegg et al. 2010) to deploy team resources in the onshore-offshore environment have emerged as the required capabilities to moderate team performance. Based on the interdependencies of the team resources involved (Malone and Crowston 1994) – team members and their knowledge – both onshore and offshore project managers need to coordinate these resources. Failure to manage the dependencies among onshore and offshore teams could predict the failing direction in which the project is bound. Project

case M was cancelled in the requirement analysis phase, as the client project manager did not have the confidence to manage the offshore resources. The main reason for the failure in case B was the inability of the vendor offshore coordinator at the onshore premises to manage the resources in the offshore location and to integrate them into the project team. Apparently, the offshore coordinator was only acting as an extended official of the Indian company in Switzerland, and each arm of the same company operated without much organizational coordination.

The vendor offshore and onshore teams are prone to coordination failures. For instance, the onshore vendor project manager of project case Q admitted that the onshore team could not offer the required assistance to the offshore team: "In this particular instance the offshore components of the team were really the tail of the dog. They were not the part that bit or barked. … We had a hybrid model and there was supposed to be an onshore team of people who did have experience in the insurance industry and did have experience as business analysts, integration with the customer, integration with the business analysts, integration with the business, really, to define clear requirements and use cases and to come up with a very clear, technical design document and architectural design documents. Neither of those things happened." The client and vendor onshore teams failed to notice the knowledge dependencies and the need to coordinate among teams to transfer the knowledge about insurance domain that the offshore team lacked. This led to poor deliverables and eventually also to project cancellation.

Coordination involves putting the right team resources in the right place during the course of the project to avoid management overhead and information asymmetries. As Kraut and Streeter (1995) note, the coordination of teamwork has been found to affect the effectiveness of the team. Faraj and Sproull (2000, p. 1555) describe coordination as "team-situated interactions aimed at managing resources and expertise dependencies." Addressing offshore-specific attributes such as distance, language, and culture (DeLone et al. 2005) results in minimum friction during knowledge transfer. Further, Kotlarsky, van Fenema and Willcocks (2006) found that coordination in terms of organization, work, technology and social interactions allows for better management of knowledge interdependencies.

According to McGrath (1991), the project team needs to consider the possibilities for interaction and the synchronization of activities within a team. However, the project resources and efforts need to be coordinated between teams from different organizations in OOSD projects. The project managers' understanding of national and organizational differences as well as of the sensitivities of the other teams plays a significant role in avoiding project failures. Both client and vendor teams need to acquire the capabilities (knowledge and capacity) to coordinate team members and their expertise for the project execution. That includes managing dependencies by assigning tasks to team members, allocating resources to train the counterparts, and synchronizing activities (Malone and Crowston 1990). We formulate the following proposition to emphasize the necessity of team coordination in OOSD projects.

Proposition 5: Coordination of project team resources among the onshore and offshore teams will reduce the likelihood of project failure in OOSD projects.

4.3. Summary

In this chapter, we investigated the unique or specific aspects of offshore-outsourced software development (OOSD) projects related to the team level that predict failures. Since there has been scant empirical work on project failures in IS research, this exploratory research analyzed development failures by analyzing both client and vendor perspectives. We identified several concrete aspects that predict failures; these include both offshore-specific aspects that are unique to OOSD projects (project team-building efforts, team collaboration, awareness of shared work context, and onshore-offshore team coordination) and aspects that can also appear in domestic outsourcing projects (shared project execution structures and team member competencies). Although some knowledge of these aspects already existed in the literature through research in contexts other than OOSD projects, they offer a basis to understand the early project issues leading to failures, thus helping illuminate EWSs of failure.

We further developed theoretical propositions grounded in empirical data that predict team development and failures of OOSD project team (consisting of client onshore, vendor onshore and vendor offshore teams). Team-level analysis of project failures that integrates different teams forms the major contribution of this analysis. Aspects of team characteristics that predict failure in three higher-level team categories emerged from this qualitative study to explain the team performance and dynamics that led to project cancellations. We juxtaposed these emerged aspects of team characteristics that lead to failure with the extant literature to situate the relevance of various properties that point toward project failures. The higher-level categories derived from the empirical data include team initiation, team interactions, and team moderators.

The team initiation category includes the various aspects of team-building efforts and the set-up of shared project execution structures by onshore and offshore teams. The integration of team members during the team-building process by fostering the development of shared identity between teams was found to aid team development. The emerging state of shared understanding of project structures between onshore and offshore teams provides a common basis for the execution of the OOSD project.

The category of team interactions includes the collaboration between teams and the team's awareness of the shared work context; these are relevant to interaction between the various parts of the project team. We found that direct collaboration between all teams is crucial if failures are to be avoided; in particular, we noted that allowing collaboration between vendor offshore and client onshore teams to remain indirect is prone to causing undesirable results. Awareness of the shared project context was identified as an emerging state that provided a stage for team members to identify with the onshore-offshore project context.

The team moderating category influenced the development of the team throughout the project through team member competencies and onshore-offshore team coordination. Team competencies, we found, are a restricting factor that depends on the availability of competent project members in the dynamic Indian offshore market. Coordination of

team resources at onshore and offshore locations was found to moderate the project performance.

We found McGrath's (1991) time, interaction, and performance (TIP) theory to contain some useful guidance regarding performance within single teams in an organization. However, the multiple teams at offshore and onshore sites involved in OOSD projects on both vendor and client sides demanded that we address inter-organizational and multi-national project cooperation, something that is not included in the TIP theory. Further, agency theory clarified the problematic of behavior uncertainties and adverse selection of team members. Our theory of multiple teams predicts project development failures in the OOSD project context. We developed theoretical propositions regarding project failures in OOSD projects that together argue that in order to avoid failures, the onshore and offshore teams from the vendor and client sides ought to work as an integrated project team. The six unique team aspects based on retrospective empirical research predict team-level project failures in OOSD projects to a great extent. These team aspects together could define the project context risk that project managers need to consider while engaging in OOSD projects. Our focus has been on a high-level team analysis examining the unique aspects of each team involved. Detailed team dynamics regarding each aspect need to be studied using case study research, provided both vendor and client sides agree to such sensitive research.

We also examined cultural aspects and work practices, which we see as the creation and reproduction of meanings and practices between onshore and offshore teams (Brannen and Salk 2000). Although we found national cultural dimensions to be relevant, we also discovered that they were less reliable as predictors of issues that could lead to project conflicts. Finally, we found a mutually satisfactory working culture to be important: the integration of work practices from both offshore and onshore sites was found to result in better outcomes than the imposition of one-sided work practices in the project team.

5. EWSs of OOSD project failures

5.1. Introduction

Early warning signs (EWS) have been identified as a project management instrument to manage issues arising in the project (Nikander and Eloranta 2001; Kappelman, McKeeman and Zhang 2006). A review of the literature shows that only a few empirical studies analyze the EWSs of failure. The context of offshore-outsourced software development (OOSD) projects, in particular, is an unexplored area that calls for more research. The causes of issues will over time appear as project issues. In the case of project failures, the project issues that lead to project failure can be regarded as failure issues (Philip, Schwabe and Ewusi-Mensah 2009). The failure issues as well as their causes can be perceived as the EWSs of failure in the early project stages (figure 14).

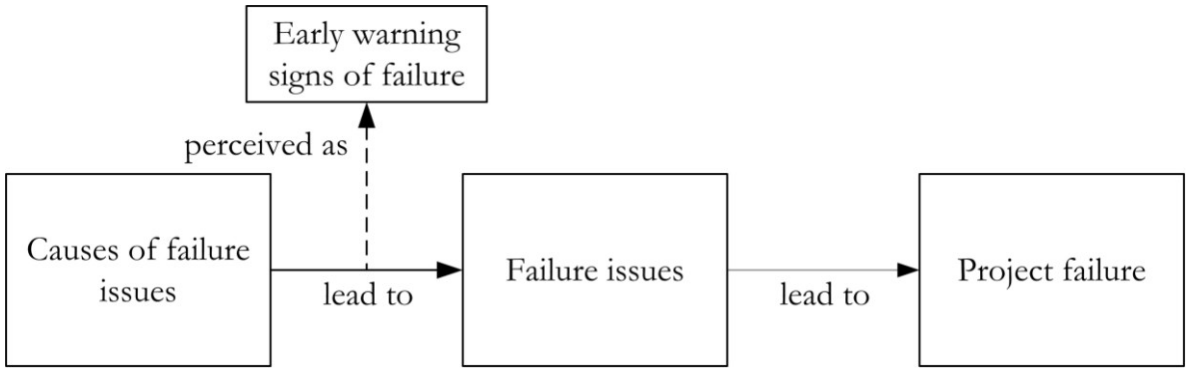

Figure 14: Situating EWSs of failure

We have analyzed the team-level aspects that lead to project failures in chapter 4. These unique aspects of failure remained relevant throughout the lifecycle of the project. In this chapter, we will concentrate on the team-level dynamics in the early project phases. Naturally, the definition of early phases can vary across organizations – especially in an outsourcing project, where the vendor project members come to the project later in the project initiation stage. For our study, we considered the first 20 percent of a project's collaboration between the vendor and client as relevant for studying EWSs. Recognizing issues in this early phase allows project managers to take corrective measures to finish the project as originally planned (Kappelman, McKeeman and Zhang 2006).

Our research concentrates on problems or issues that appeared between clients and vendors. As the client and vendor in an OOSD project might not work together in the first 20 percent of the project's calendar in the client organization, we have adopted a pragmatic definition of EWSs (as discussed in chapter 1). We define *EWS* as a project state or indication that warns one about possible or impending problems or issues in the first 20 percent of the project's cooperation or collaboration period between clients and vendors (based on Kappelman, McKeeman and Zhang 2006).

On the one hand, the computer-mediated communication (CMC) that has become established as the primary form of collaboration in the semi-virtual OOSD project context, leads to improved performance. Yet on the other hand, the organizational and national differences related to CMC can also lead to difficulties in evaluating the teams during the collaboration, and thus complicate the detection of EWSs. The lack of understanding of the EWSs of failures in OOSD projects calls for their identification from the perspective of project managers, who are close to the execution. In this chapter, we focus on the early stages of OOSD projects, and explore the team-level dynamics that lead to failure[12]. We reiterate the research question defined in chapter 1:
What are the early warning signs specific to offshore-outsourced software development project failures that are related to the project team and how can the project managers perceive them?

5.2. EWSs of failure

Our data analysis of failed project cases found two types of EWSs of failures in OOSD projects: offshore-specific and non-offshore specific EWSs (Philip, Schwabe and Wende 2010). *Offshore-specific EWSs* are unique to OOSD projects and require special attention. *Non-offshore specific EWSs* are not unique to OOSD projects, but in order to overcome the disadvantages caused by the offshore environment, they require more attention in that environment than in domestic software outsourcing projects. Further, the identified EWSs emerged as three higher-level categories of EWSs of failure at the team level, namely, team initiation, team interactions, and team moderators. These higher-level categories and their sub-categories formed the unique aspects of failures in OOSD

[12] Parts of this chapter have been published earlier in (Philip, Wende and Schwabe 2013a).

projects that emerged during the whole project life and that we discussed in the previous chapter. The sub-categories that will be discussed in the following sections include shared project execution structures, team member competencies (non-offshore specific EWS), project team-building efforts, awareness of shared work context, team collaboration, and onshore-offshore team coordination (offshore-specific EWS).

As briefly outlined in chapter 4, team initiation efforts to build up the OOSD project team include setting up shared project structures and engaging in team-building efforts. These efforts influence team interaction, which is visible in the collaboration between teams and the shared context awareness among the project teams at onshore and offshore locations. Further, team moderators, such as onshore-offshore team coordination and team-member competencies, could lead to improved project performance by influencing the team development categories of team initiation and team interactions throughout the OOSD project.

Our data analysis shows that project managers notice directly some EWSs of failure that lead to project issues; however, some EWSs could only be noticed indirectly in the project. In order to understand the presence and perception of EWSs, we differentiate the EWSs of failure into early indications and issues that can be perceived directly and indirectly. Project managers found issues in the early project stages that cautioned them about project issues, which we refer to as *early warning issue* (EWI). *EWI* is defined as an early project issue that requires attention in the first 20 percent of the project's cooperation or collaboration period between clients and vendors. Nikander and Eloranta (2001) and Kappelman et al. (2006) have identified EWSs that come under the category of EWI, which were not easy for project managers to notice during the project.

We refer to the category of EWSs that offered more concrete warning signals for project managers to identify during the project as *early signals* of failure. *Early signal* is defined as a project indication or situation that provides concrete information about an early warning issue of failure during the first 20 percent of the project's cooperation or collaboration

period between clients and vendors. Early signals of failure[13] in OOSD projects appear as weak signals during the project start. Nikander and Eloranta (2001), Havelka and Rajkumar (2006) and Kappelman et al. (2006) have identified EWSs that are termed early signals in this work.

We found that an EWS of failure could be described as a pair of EWI and early signals of failure, where the early signals could comprise more than one indicator. The presence of one or more early signals of failure could predict the existence of EWIs of failure. The causes of project issues might be noticed first as early signals of failure and then as EWIs (figure 15). The causes of failure issues can thus be determined through the presence of both the EWIs and early signals of failure. The early signals of failure can point to the project state or condition that requires analysis, which the project managers can then examine to see whether any EWIs of failures have surfaced or could be identified. For instance, in project case A, the early signal of not promptly addressing escalation predicted the existence of the EWI that the vendor team does not honor deadlines. Escalation not addressed promptly together with the vendor failure to honor deadlines formed the EWS of failure. This eventually led to tensions between client and vendor teams that resulted in failure issues[14] such as timeline slippage and costs exceeding the approved budget. This scenario then led to project failure or cancellation. The root causes of the issues were the lack of onshore-offshore project management know-how and cultural differences regarding time perception. Vendors considered fulfilling the tasks of primary importance, without giving due importance to agreed milestones.

[13] Drummond and Hodgson (2003, p. 151) defined metaphor as a "linguistic device whereby one phenomenon is understood in terms of another." We use the terms "early warning signs" and "early signals" in this thesis as metaphors in the context of project failures to investigate the issues and problems during the early project phases. Oxford dictionary (1993) defines the word "sign" as "a thing indicating or suggesting a quality or state etc.; a thing perceived as indicating a future state or occurrence," whereas "signal" is defined as "a usually prearranged sign conveying information, guidance etc. especially at a distance."

[14] Failure issues are issues critical enough to call for project cancellation.

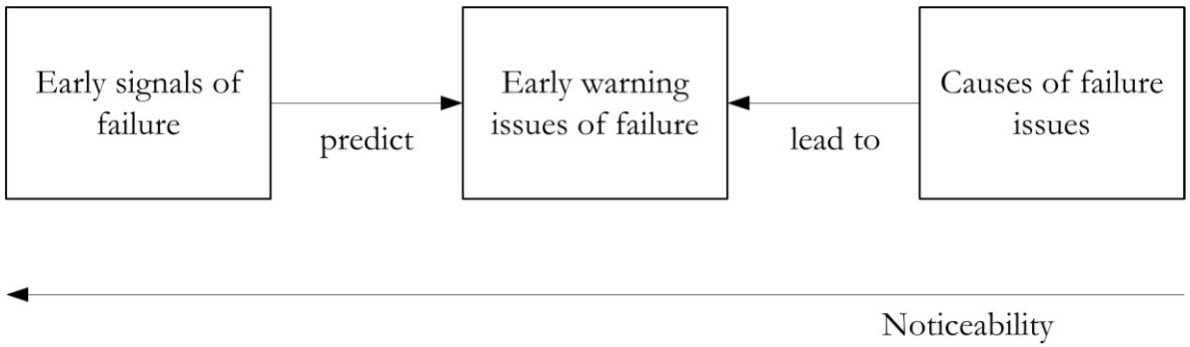

Figure 15: Recognizing early warning signs of failure

Although the early signals are more concrete for the project managers to identify during the project, they may not point unambiguously to an EWI. For instance, the early signal of missing interaction between vendor offshore and onsite teams could indicate that there exists a warning issue of lack of collaboration between vendor teams. However, this signal could also mean that the vendor onshore team lacks the motivation to work with the vendor offshore team. Early warning issues may become distinct as the project progresses; the presence of other early signals will then help project managers assign the early signals to a particular EWI of failure and thus clearly identify the EWS of failure as a pair of EWI and its early signals. This check for the existence of EWI allows the elimination of false positive signals. The causes of issues that lead to project issues also eventually become noticeable as the EWSs of failure appear distinct from the project. Some of the EWIs and early signals of failure that were identified could also appear as causes of failures. A detailed discussion about the causes of failures as well as failure issues is out of scope of this work, as we focus on the EWSs of failure.

In the sections below, we discuss the EWSs of failure that we identified from the failed project cases. Section 3.4.2 provides an overview of the project cases that are referred to in the data analysis.

5.2.1. Team initiation

5.2.1.1. Project team building efforts

A semi-virtual project team that understands its function and consequently makes the required effort to fulfill the team objectives provides the basis for successful team

performance. As timely face-to-face meetings between onshore and offshore teams cannot always take place in the OOSD project context, an important role in avoiding project failures is played by the project managers' initiatives to build a project team whose members collaborate with their counterparts at onshore and offshore sites. Below, we discuss the EWSs of failure that we identified and that are related to team building efforts. An overview of the EWIs of failure regarding project team-building efforts and their early signals is shown in table 8. The project cases are given in brackets.

Early warning issues	**Early signals**
Absence of trust between vendor and client teams [A, B, N, O]	-Vendor offshore team's efforts not appreciated by client team [O] -Lack of opportunities for informal interactions [N, O] -Expectation gaps in technical deliverables [A, B]
Lack of team-building exercises by client and vendor [D, K, N, P]	-Managers ignore team-building efforts [K, P] -Lack of project team kickoff meetings [D] -Lack of procedures to integrate new team members [N]

Table 8: Team-building efforts

Lack of trust between vendor and client teams is an EWI, which could manifest as the lack of any appreciation by client team members for the efforts made by vendor offshore members. In that case, members of neither team will feel part of the extended project team. Other indicators of a lack of trust are absence of opportunities for informal conversations or online meetings and negative first impressions in terms of expectation gaps in technical deliverables. Klakegg et al. (2010) consider lack of trust in project organization an EWS that is critical for project execution. Kern and Willcocks (2000, p. 331) define trust in the IT outsourcing context as "the belief that a party's word is reliable and that it will fulfill its obligation as stipulated in the agreement, by acting predictably and fairly." The gaps in expectations regarding the efforts and outputs by both onshore

and offshore teams could provide early signals regarding the direction in which the team develops. Rottman and Lacity (2008) note that the social networks between the US client and the domestic vendor could not be replicated with the Indian vendor because of the cultural differences and the different offshore work environment. The institution of occasional face-to-face meetings and site visits between both client and vendor members was reported to improve the social ties between the offshore and onsite members (Oshri, Kotlarsky and Willcocks 2009) and eventually lead to better rapport and trust (Kotlarsky and Oshri 2005). However, face-to-face meetings remain restricted to a small part of the life of the OOSD project in order to not undo the benefit from cost arbitrage.

Insufficient attention to and promotion of team-building exercises by both client and vendor managers is an EWI that leads to poor cooperation and bonding between teams. The project manager of case P recalled that ignoring team-building efforts was an early signal that resulted in an incoherent team and eventually led to the cancellation of the project: "At the expectation end, there was no need to build a team. By definition, there was no team charter. Then you have no contract or no rules being defined on how you will behave in presence of conflicts." Further early signals include lack of project team kickoff meetings and of procedures to integrate new team members into the team. Koh, Ang and Straub (2004) find that building effective inter-organizational teams is an obligation of the vendor. However, both the vendor and the client have responsibility for team-member integration. Unless both client and vendor project managers have an interest in pursuing integrated team-building efforts, the project could head toward a team-level failure.

5.2.1.2. Shared project execution structures

Work practices within a project team provide warning signs regarding the team's development. Organizational and professional cultures, rather than the national culture, will dominate team behavior related to work practices (Karahanna, Evaristo and Srite 2005) in OOSD projects. A shared project framework is a prerequisite for the execution of offshore projects.

An overview of the EWIs of failure that emerged from the project cases regarding project execution structures and their early signals is given in table 9. The lack of a shared understanding regarding deliverables could lead to incorrect deliverables. Such problems can be observed in cases where the expected deliverables are not defined or explicitly agreed upon before the start of work (Herbsleb and Moitra 2001). For instance, the lack of a common understanding of deliverables led to poor initial deliverables in project case P, which in turn eventually led to the cancellation of the project.

Early warning issues	**Early signals**
Lack of a common understanding about deliverables [A, J, L, P]	-Expectation gaps in deliverables [A, J, P] -Lack of explicitly agreed project outputs [L]
Vendor offshore team fails to honor deadlines [A, I, J, L]	-Deadlines not met by vendor offshore team [I, J, L] -Escalations not addressed promptly [A]
Lack of shared concepts for project execution [D, G, K, O]	-Vendor and client teams have different methodologies, documentation, and change management processes [D, O] -Lack of identical software and hardware versions at client and offshore sites [G, K]
Business requirements not understood properly by vendor team members [A, K, L, N, P]	-Expectation gaps in technical deliverables [A, N] -Ambiguous requirements with room for misinterpretations [K, L, N] -Requirement assumptions by vendors are not verified [P]

Table 9: Shared project execution structures

The vendor offshore team's failure to meet deadlines commonly has a cultural dimensions (Huang and Trauth 2008), as the team may subordinate meeting deadlines to meeting objective. Indicators of this warning sign could include the vendor team missing deadlines or not addressing escalations as promptly as expected by the client. In global

teams, variation in the sense of urgency and in priorities assigned to the execution of tasks on a temporal scale might be attributable to differences in the perceptions of time. Saunders, Van Slyke and Vogel (2004) note that regions with predominant Hindu or Buddhist cultures, like India, tend to view time as timeless, i.e., having a cyclical, recurrent, long-term, and polychronic nature, whereas the Western vision of clock time characterizes time as having a linear, uni-dimensional, short-term and monochronic nature.

In addition to divergent perceptions of time, team members may not agree about the process of project execution. Differing concepts of project execution between client and vendor teams can lead to diverging outcomes. The project manager of case O remarked on the missing project structures that led to a deadlock: "…the lack of process or the key responsibility charged or responsibilities lead to the situation where people find no directions, whether they are supposed to do that or not." Project managers can notice the differing concepts when different methodologies are followed or change management and documentation processes are not established. Different software and hardware versions used at client and vendor sites can also indicate diverging outcomes.

The vendor team's lack of understanding of business requirements can also lead to ambiguous results. This can be detected using feedback loops (Fortune and Peters 2005) as soon as the requirement specifications developed by the vendor team are verified by the client. Specifications from the client side can leave room for misinterpretations, especially when the offshore team members are not well versed in domain knowledge. The verification of requirements by non-specialists might reveal the ambiguities. Incorrect assumptions made by the vendors may become evident in the deliverables, unless the assumptions are verified with client team members.

5.2.2. Team interactions

5.2.2.1. Collaboration between teams

The lack of adequate collaboration between vendor teams as well as between vendor and client teams has emerged in our research as one of the EWSs of failure relevant in the OOSD project context. The establishment of collaborative processes on the inter-team

level during the early project phases improves the team bonds and thus positively affects team performance, which provides early warning indicators toward the later project phases (Hoegl, Weinkauf and Gemuenden 2004). Table 10 presents an overview of the EWIs of failure and their early signals that emerged from the project cases regarding the question of collaboration between teams.

Inadequate collaboration between vendor's onshore and offshore teams can lead to the project team missing the project objectives. This EWI may be noticed from the lack of regular meetings or interactions between the vendor's offshore and onsite teams. Vlaar, van Fenema and Tiwari (2008) show that the knowledge and experience asymmetries of onshore and offshore vendor teams force them to engage in sense-making activities to reduce the asymmetries. The absence or scarcity of interactions in an OOSD project could result in team members having varying definitions of the situation, which then affect the collaboration process. Although the two teams are officially part of the project, they may not feel the need for collaboration. This might be the result of both vendor organizations operating independently and the offshore team being expected to deliver by default.

Early warning issues	**Early signals**
Lack of collaboration between vendor teams [B, N, O]	-Lack of regular meetings [B, N, O] -Missing interaction between vendor offshore and onsite teams [B, O] -Vendor offshore and onsite teams are part of independent organizations and both are not integrated into the project [B]
Lack of agreed communication structures between vendor and client teams [C, N, O]	-Communication paths are not clear for team members [C, N] -Lack of interactions between client and vendor teams [N, O]
Client team mistrusts vendor offshore team members [O]	-Client team member changes use cases without informing vendor offshore team [O]

	-Lack of interaction between client and vendor offshore teams [O] -Vendor offshore team not respected or appreciated by client team [O]

Table 10: Collaboration between teams

An agreed-upon communication structure forms the prerequisite to efficient collaboration. An indicator of this EWI would be an undefined path for communication, which leads to communication breakdown in the team. The offshore client project manager of case O states the following regarding communication and alignment in the project: "It [communication] was not to the level where it should have happened. Of course there was some communication, ad-hoc communication, but there was no formal team-based communication. So that was one of the reasons, which resulted in a situation where the offshore team was truly getting misaligned with the complete project objectives." In project C, the vendor onsite coordinator did not follow up on the issues with the offshore team and the client expected the vendor team to resolve internal problems by itself. Another indicator of a lack of communication structure is the lack of interactions between the client and vendor teams. Damian and Zowghi (2003b, p. 158) maintain that in the early phases "communication between remote stakeholders will have the greatest effect in reducing the impact of global collaboration on managing requirements in multi-site organizations." Frequent and intense communication will improve the chances of understanding the remote counterparts (Herbsleb and Moitra 2001). Particularly complex projects with interdependent and uncertain tasks require informal communication and coordination measures (Cramton and Webber 2005). Kern and Willcocks (2000) also note frequent communication leading to improved trust, which in turn leads to improved informal and formal communication between team members.

Mistrust of vendor offshore team members by the client team is another EWI that may lead to project issues. Missing interaction between client and vendor offshore teams can be an indicator of mistrust and warn of failure. The offshore project manager of project case O remarked the following about missing trust: "It's difficult to say that, but there was a lot of resistance from the local team in offshoring this project. There might be

different reasons for that - jobs and security, different reasons for that. But I cannot tell you all of them, but there was not a collaboration. There was not an open team which would like this implementation to be done. They were not extending the collaboration that we expect in such a setup of the project. That was a limiting factor." We found that mutual trust (Lee, Huynh and Hirschheim 2008) between vendor and client teams affected knowledge sharing and thus collaboration. Especially in virtual or semi-virtual environments, trust between counterparts was a crucial factor in the team development as trust-building measures, such as face-to-face meetings and workshops, are limited in OOSD projects (Lee-Kelley, Crossman and Cannings 2004). In project O, the client team members made changes to use cases without informing the vendor offshore team, which led to a mismatch of expectations. A client team's lack of appreciation of good work done by offshore team members, or treatment of them as "software factory workers," thus denying them respect, might form an indicator that points toward mistrust on the part of the client team. The concerns of client team members regarding job security could play a role in causing mistrust.

5.2.2.2. Awareness of shared work context

Recognition of differences in the shared work context and the failure to adapt and communicate these differences has been identified as one of the EWSs of failure in the OOSD project context. Cramton (2001) found that the virtual team members' lack of skills in detecting local contextual differences and constraints across location and in sharing them with counterparts caused coordination as well as relationship problems among team members. The organizational culture of virtual teams as well as their work practices further exacerbate the problems that may prevent the emergence of a shared context between onshore and offshore teams. On the other hand, informal team activities result in the development of social ties and rapport (Kotlarsky and Oshri 2005) between the onshore and offshore teams and thus allow a smooth knowledge transfer, which in turn leads to a successful collaboration.

The EWIs of failure regarding shared context awareness, along with their early signals, are listed in table 11. A client's escalation of an issue may not be handled seriously by vendors, as the vendors may have different time perceptions and priorities. The early

signals include assurances of normality by the vendor and promises that everything will be perfect with the next deliverable. Repeated expectation gaps in deliverables can be considered an indicator that the project could be heading for trouble. In project cases A and B the deliverables got worse after the assurances from the vendor's onsite managers. As the client team cannot check the progress of development that happens at the offshore site, escalations are anticipated to be followed up with expected results. This failure in meeting expectations will result in problems that Sarker and Sahay (2003, p. 251) define as occurring "when a team member is perceived as contradicting, discrediting, or doubting an agreed upon norm of interaction." Such troubles between virtual teams could damage the trust between teams and the teams' motivation to work with their counterparts. Lea and Spears (1991) report that the breakdown of social constraints and regulations in the virtual interactions can lead to antinormative behaviors, as there is less effective possibility for control and supervision in the virtual scenario as compared to co-located development.

Early warning issues	**Early signals**
Escalations not taken seriously by vendor [A, B]	-Assurance of normality by vendor when issues are raised [B] -Repeated expectation gaps in deliverables [A]
Vendor onsite team lacks motivation to work with offshore team [O]	-Missing interaction between vendor offshore and onsite teams [O] -Vendor onsite team does not provide the requested information [O]
Lack of openness to discuss problems by vendor offshore team [A, I]	-Delays of deliverables not communicated in advance [A] -Non-admission of technical problems or mistakes [I]
Insufficient cultural intelligence among vendor and client teams [I, L, R]	-Vendor offshore team members do not challenge requirements [I, L] -Vendor offshore team members do not talk

	openly in meetings in the presence of superior [C, R]

Table 11: Awareness of shared work context

The project case O failed primarily because the vendor onsite team lacked the motivation to work with the offshore team; this was also their first project in offshore mode. The lack of motivation can be indicated by the absence of interaction between the vendor's offshore and onshore members. Vendor onsite team members may not promptly provide the information requested by the offshore team, waiting instead for follow-up requests before acting. Maznevski and Chudoba's (2000) study of virtual teams found that the effectiveness of a global team outcome develops as a function of interactions on a timely basis. This temporal interaction failure between vendor teams has emerged in our research as an EWS of failure in OOSD projects.

The Indian vendor offshore team may not openly communicate information about problems or delays within the project to the client team, as this might put future team engagements in jeopardy. The indicators of this EWI include deliverable delays not being communicated in advance (Rottman and Lacity 2008) and not openly admitting technical problems or mistakes during the project. Hoegl and Gemuenden (2001, p. 437) argue that lack of openness within teams could hinder "the most fundamental function of teamwork, namely the integration of team members' knowledge and experience on their common task." Following strict team hierarchy in projects might also lead to a restricted communication style that hinders openness (Herbsleb and Moitra 2001). Klakegg et al. (2010) note that the absence of a culture of openness affects communication and thus becomes an EWS of failure.

Lacking organizational and professional cultural intelligence regarding the other team will not lead to an awareness of shared work context. One possible indicator is the lack of initiative to ask questions or challenge requirements by vendor offshore team members. This reluctance could be rooted in an unwillingness to show disrespect to the client or in a wish to protect the dignity of one's team or the client (Nicholson 1999). Beck et al. (2008) argue that the cultural intelligence of team members positively affects project

management and thus the outcome. In contrast to individualism, teams that value collectivism are obliged to maintain the face of the team and meet the obligations placed on them by the team (Bochner and Hesketh 1994). This social obligation could result in differences in team collaboration. The project manager of case C commented as follows on difficulty of collaboration, which acted as an early signal of project failure: "And the reason is that I think that the teams over there are very hierarchical, they have their internal structure of importance and of the supervision and it's difficult to flatten that." Sahay and Walsham (1997), following Gidden's structuration theory, draw upon the rules and resources instantiated in social relationships to explain the challenges to implementing an information system in India in a joint Indo-US project. According to them, the variety of social structures (community, religion, family, professionalism, and academia) that shaped the relations between team members helped explain the managerial attitudes. The clear superiority of Indian managers over other members of the Indian team made their attitudes highly instrumental in moving the project forward.

Vendor offshore team members also might not talk openly in the presence of their superiors during a meeting or workshop because of the hierarchies and social structures followed in the team. The silence of team members in project case B was interpreted by the client project manager as a normal project situation, and the client realized only after the first delivery that the offshore team did not understand the requirements.

5.2.3. Team moderators

5.2.3.1. Team member competencies

EWSs of failure in the area of team member competencies has emerged in our research as one of the important non-offshore specific EWSs, that is, EWSs that can apply to domestic projects as well. The dynamics of the Indian offshore market have shown the relevance of close scrutiny of the project-related skills and competencies required of team members. Most vendor offshore teams in failed projects had a combination of fresh graduates and senior members, which indeed is part of the low-cost offshore business model. The high percentage of fresh graduates in the vendor offshore team can result in

asymmetries related to knowledge and experience (Vlaar, van Fenema and Tiwari 2008) compared to the vendor onshore and client teams. Further, career progression towards management positions happens faster in India than in Western countries. As the client project manager in case H as well as the vendor onshore manager in case I noted, the aspirations of offshore team members regarding career development may affect the functioning of a project team. As soon as a team member becomes an expert, she or he expects monetary compensation, promotions, onsite visits, and the like. Unless the offshore team member remains motivated, a new person can take over her or his job. This vicious cycle in offshore projects might result in offshore team members lacking important competencies regarding domain-specific knowledge, communication competency, and technical skills.

Table 12 provides an overview of EWIs of failures regarding team member competencies and their early signals. The lack of domain-specific knowledge (Rottman and Lacity 2006; Iacovou and Nakatsu 2008) can be perceived when the knowledge feedback mechanism reveals inadequacies in business knowledge. Such mechanisms include playback of knowledge gained through verification workshops, or the request of a written summary of discussed points. Attrition in the vendor offshore team (Vlaar, van Fenema and Tiwari 2008) as well as the absence of subject matter experts (SME) from the vendor offshore team are indications that the project team lacks industry-specific know-how. Project case B, in the banking sector, suffered knowledge and competency issues as the four key members from the vendor offshore teams left the organization after one year of the five-year project.

Early warning issues	**Early signals**
Vendor offshore team lacks domain-specific knowledge [B, K, Q]	-Knowledge feedback mechanism shows lack of adequate business knowledge [Q] -Lack of SME in the vendor offshore team [N, Q] -Key vendor offshore team members leave the project [B, K]

Project team cannot elicit business specifications thoroughly [E, I, Q]	-Lack of SME in the vendor onsite or offshore team involved in requirement analysis [E, Q] -Lack of team members with organization-specific knowledge involved in requirement analysis [I]
Vendor offshore team members lack communication competency [A, B]	-Offshore team members are non-communicative or silent [A, B]
Vendor team members lack required technical skills [A, B, C, K, H, Q]	-Low quality of technical deliverables [A, C, Q] -Expectation gaps in technical deliverables [A, K, H] -Key vendor offshore team members leave the project [B]

Table 12: Competencies of team members

The inability of the project team to elicit business specifications in a clear and unambiguous manner affects the later development stages. Lack of an SME on either the onsite or the offshore team of the vendor affects the requirement analysis. Project case Q failed because the vendor offshore team lacked members with insurance-domain knowledge. The presence of at least one team member from the client side in the project team with organization-specific knowledge could help elicit the requirements efficiently. This is because the transfer of encultured and embedded knowledge within an organization (Sahay, Nicholson and Krishna 2003) works better with the presence of a client employee.

The project manager of case A noted that some offshore team members suffered from a lack of communication competencies to such a degree that they eventually had to be replaced: "There were two guys who were not very communicative. They were not used to like very open or very communicative, so they were keeping silent for most of the time, even on asynchronous communication." But the project also suffered because of

the lack of domain-specific and technical skills required for developing the business intelligence project. The missing communication competency of the vendor team members may have affected the conveyance of information within the project. Members who do not exchange information or remain silent when they are asked for information are demonstrating poor interaction skills.

The lack of technical skills on the part of the vendor team (Iacovou and Nakatsu 2008) to do requirement analysis or system design also affects project development. Senior developers were missing in project cases H and I, contrary to the promises made by the sales and marketing executives of the vendor team. Low quality or expectation differences (Lane and Agerfalk 2007) indicate a lack of the required technical skills. Key project members leaving the project is another indication of a vendor team that lacks technical skills. In terms of the methodologies applied, we found that iterative development with more intermediate deliverables provides more cues regarding the quality of deliverables than the pure waterfall model popular in OOSD projects.

5.2.3.2. Onshore-offshore team coordination

Onshore-offshore team management by both the client and vendor organizations has emerged as one of the capabilities crucial to executing the project successfully. In the multi-national organizational setup, where the vendor offshore team works as an extended arm of the vendor onshore team, it is imperative that both client teams acquire this capability. Project managers' ability to coordinate project resources by allowing efficient interactions minimizes issues among team members in the onshore-offshore environment (Carmel and Tjia 2005).

Table 13 provides an overview of the EWIs of failure and their accompanying early signals regarding onshore-offshore team coordination. Lack of team coordination know-how leads to OOSD projects getting out of hand and thus derailing the timeline, budget, and quality expectations. Hoegl, Weinkauf and Gemuenden (2004) found that inter-team coordination in the virtual environment was positively related to the quality of teamwork. If both the client and the vendor side suffer from a lack of project managers with

experience in distributed or virtual environments, problems could be challenging to head off. Iacovou and Nakatsu (2008) have identified project management know-how by the client as relevant for offshore project success. Team coordination forms part of the capability to manage offshore projects (Erickson and Ranganathan 2006). However, in the multi-national organizational context, both client and vendor need to possess the team coordination capabilities. Other early signals of failure include the absence of shared project plans at client and vendor locations and a lack of an integrated organization chart with defined team members to contact for queries. Sidhu and Volberda (2011) note that the involvement of the offshore team in an early project stage will lead to positive results regarding the coordination of team tasks. The size of team members is another signal of challenged team management. Offshore managers can be overwhelmed if they are expected to handle more than 10 employees.

Early warning issues	**Early signals**
Lack of onshore-offshore team coordination know-how by client and vendor [B, E, F, M, N, O, P]	-Neither vendor nor client project managers have experience in distributed or virtual projects [M, O, P] -Lack of a shared project plan [F] -Lack of an integrated organization chart with defined contact persons [F] -Vendor offshore managers manage large teams [B, N]
Vendor onsite team fails to transfer knowledge to offshore team properly [H, N]	-Knowledge feedback mechanism shows lack of understanding by vendor offshore team [H, N]
Vendor onsite team simply expects the offshore team to provide deliverables based on specifications [N, O, P, Q]	-Lack of regular meetings [N] -Lack of knowledge feedback mechanisms [P, Q] -Complex knowledge areas not identified [O] -Questions from vendor offshore team are

	blocked by vendor onsite team [N, P]

Table 13: Onshore-offshore team coordination

Project case Q was cancelled as the vendor offshore and onshore teams lacked interactions and also knowledge feedback mechanisms. The project manager noted: "…you need to have a kind of feedback to get clear on what needs to be done, why it needs to be done and whether something written in a requirement is a typo or that has truly been meant that way." The coordination of knowledge (Espinosa et al. 2007) across sites forms a challenge for project managers at different locations. The achievement of mutual knowledge between onshore and offshore teams has proved difficult, as dispersed teams cross cultural and organizational boundaries that amplify the feedback lags regarding information exchange and interpretation. This information lag can lead to misinterpretation of embedded and tacit knowledge by offshore members, which then results in incorrect deliverables (Nicholson and Sahay 2004). The offshore team's lack of absorptive capacity and the arduous relationship involving distance between the teams involved can function as barriers to the transfer of sticky knowledge within the global organization (Szulanski 1996). An early signal of this knowledge transfer issue comes from knowledge feedback mechanisms that can reveal the lack of proper understanding on the offshore side. Complex knowledge, in particular, requires intensive feedback loops. Oshri, van Fenema and Kotlarsky (2008) report the use of a transactive memory system in an Indian vendor organization that combines collective expertise and communication among team members to achieve a successful transfer of knowledge between onshore and offshore teams.

Another EWI that emerged from the data was the expectation of the vendor onsite team that they would receive the deliverables based on specifications on an agreed deadline without much interaction in between. The indicators of this misguided assumption are the lack of regular meetings online and the lack of knowledge feedback mechanisms. The inability to invest effort in identifying dependencies in knowledge areas and the blocking of questions from the vendor offshore team by the vendor onsite team are further indicators of this assumption.

5.3. Discussion - Putting EWSs into the context of failure

Our data analysis of OOSD project failures provides new insights into the failure process of OOSD projects. We found that the EWSs of failure can be perceived by project managers by looking for the presence of early signals of failure during the early project stages. The identification of the more concrete early signals together with the check for the emergence of EWI has allowed us to understand the initial stages of failures and the process through which problems become failures in the OOSD project context. We found the analyzed concept of the EWSs of failure evolving around these two constructs, namely, early warning issues and early signals of failure.

Figure 16 depicts the OOSD project failure model that shows the process of project failure and incorporates the EWSs of failure. The causes of project issues leading to failure issues has been discussed extensively in the literature (e.g., Ewusi-Mensah 2003; Sahay, Nicholson and Krishna 2003; Philip, Schwabe and Ewusi-Mensah 2009; Wiener, Vogel and Amberg 2010). On the other hand, the causes of failure also manifest themselves as the EWSs of failure (Nikander and Eloranta 2001), which again divide into easily noticeable early signals of failure and less noticeable early warning issues of failure. This differentiation forms a main contribution of this qualitative work to understanding the early stages of project failure. Our exploratory model found that the early signals of failure could predict the existence of the EWIs of failure. The EWIs of failure could further predict failure issues, which are issues critical enough to call for project cancellation. The inability or unwillingness to manage such issues will result in project failure or cancellation.

Our exploratory model can be viewed as an extension of the EWS concept developed by Nikander and Eloranta (2001). We have extended the causal and predictive links related to the EWSs and project failures as well as elaborated the concept of EWSs of failure in our model. The causes of failure issues can be offshore-specific or non-offshore specific, or a combination of both. They can be difficult for project managers to notice in the beginning. The early signals, by contrast, are easily noticeable and, thus, the presence of EWI can be checked in the early project stages to eliminate the possibilities of false

positive signals. The failure issues that appear initially as EWIs of failure could also be perceived with equal ease. Williams et al. (2012) maintain that project leaders are generally not good at picking up EWSs. However, project managers can notice the EWIs of failure in the early project phases before the failure issues appear in the later phases.

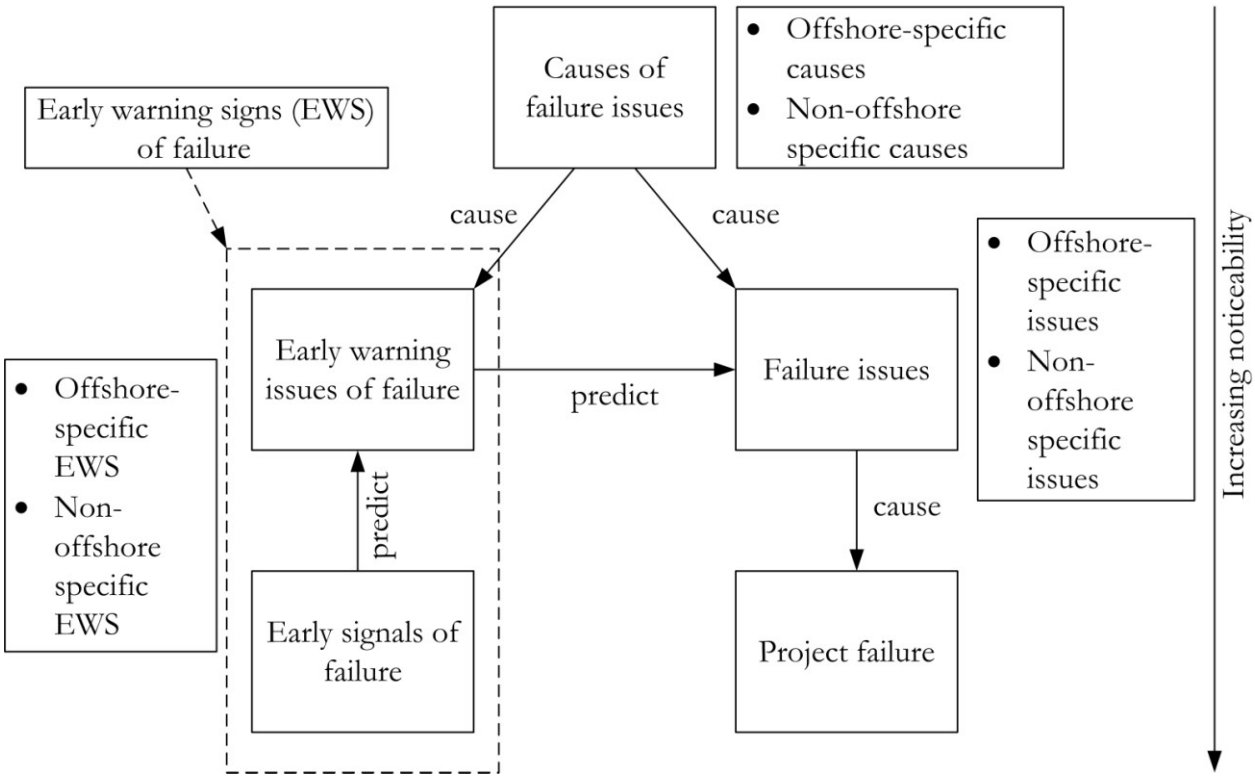

Figure 16: EWSs of failure and OOSD project failure model

As Ewusi-Mensah (2003) notes, a "multiplicity of cofactors" (p. 47) can cause the cancellation of the project, and both offshore and non-offshore factors play a role in leading to the circumstances that cause cancellation. The failure issues, their causes, and the EWSs of failure may appear as either offshore or non-offshore specific in nature. We have already discussed an example of offshore-specific EWS in section 5.2. An example of a non-offshore specific EWS would be, say, the early signal of knowledge feedback mechanism revealing the lack of necessary business knowledge in case Q. This indicated the EWI of the vendor team lacking domain-specific knowledge, which eventually led to the failure issue of a non-functioning information system and further to the project cancellation. Unless the vendor can solve the team member competency problems within a reasonable and mutually agreed time limit, the project could head toward failure.

The concept of EWSs of failure with its dual composition – EWIs and easily noticeable early signals of failure – can be used as a tool in risk management. EWIs and early signals provide advance information about project risks; however, the information regarding their probability and the impact of potential problems or issues are traditionally handled by risk management measures (Nikander 2002). This early risk perception instrument could be applied in conjunction with project assessments (Williams et al. 2012). Project assessment types during the project include project reviews, project health checks, and benchmarking (Williams et al. 2012). Concrete measures for risk identification and management (Boehm 1991) in relation to the EWSs of failure could include check lists, balanced scorecards and "traffic lights" (Williams et al. 2012).

We found that the project failures analyzed in this work happened mainly as a result of offshore-specific project issues. Only 5 out of 19 offshore projects were canceled in the later project stages as a result of non-offshore specific issues. The existence of non-offshore specific issues in the project suggests the need for a combination of EWS and risk management frameworks that can monitor and manage offshore-specific and non-offshore specific issues.

Project managers can perform only as well as the body of knowledge and experience that they bring into a project allows them to, as each project is a unique undertaking. Williams et al. (2012) differentiate between two types of EWSs – "hard" issues that are identified through formal project assessments and "soft" issues that are identified through assessment based on gut feelings. Our analysis found that most issues were hard issues that are of a technical nature and can be measured to a substantial extent. On the other hand, soft issues are difficult to measure as they include people issues related to culture, such as attitudes and values. Among the EWIs that arose in our study, the category of soft issues included such matters as absence of trust between vendor and client teams, lack of motivation by the vendor onshore team to work with the offshore team, lack of openness to discuss problems by the vendor offshore team, and a dearth of trust between client and vendor offshore teams. Williams et al. (2012) maintain that as a result of the behavioral complexities of team members, the causal relations between the root cause of

failure and EWSs are less obvious. Williams et al. (2012, p. 47) note further that addressing soft issues requires "broad experience and a deep understanding of both objectives and culture" from project managers.

Even though we elicited the experiences of project managers in terms of IT, project management, and offshore project management experiences, we were unable to establish a direct link between the project managers' experiences and their ability to notice soft issues. Such insights could be of interest to practitioners, and the level of project managers' onshore-offshore team management capability needs to be analyzed. Cultural intelligence (Beck, Gregory and Prifling 2008) regarding national, organizational, and professional cultures across teams might alert project managers to the EWSs that are of a soft nature. The presence of such EWSs in our analysis further points to the importance of OOSD projects attaining onshore-offshore team management capabilities.

In a sense, the EWSs of failure can be considered the prerequisites that should be managed in order to execute projects successfully. Among the six categories of EWSs of failure we identified, the categories of onshore-offshore team coordination and collaboration between teams are the least discussed in the literature. Yet we found onshore-offshore team coordination a particularly important feature, and further discovered that addressing both the client's and the vendor's – not just the client's – capability to coordinate onshore-offshore teams was instrumental in avoiding failure. The IS offshoring literature (Lacity et al. 2010; Wiener, Vogel and Amberg 2010) has mainly discussed the interactions between the client and vendor offshore teams. The team interaction between the vendor's onshore and offshore teams, we found, is an area that requires more research to provide insights into the work practices and organizational cultures that impede collaboration. The lack of adequate collaboration between the vendor's onshore and offshore teams was another area that is lacking in research, mainly because of confidentiality agreements between clients and vendors as well as language problems (Vlaar, van Fenema and Tiwari 2008).

5.4. Summary

In this chapter, we attempted to identify the early warning signs (EWS) of failure related to the team level in offshore-outsourced software development (OOSD) projects; we also explored how they are perceived by project managers. The empirical data shows that EWSs of failure fall into three categories: team initiation, team interactions, and team moderators. The EWSs of failure under the category of team initiation were further divided into team-building efforts and shared project execution structures. The team interaction category includes the sub-categories of collaboration between teams and awareness of shared work context. Finally, the team moderators that affect the other two categories include onshore-offshore team coordination and team member competencies. Our data analysis of OOSD project failures points to the necessity of dyadic client-vendor team-level interactions and consequent measures to avoid project failures. In particular, we found that the dynamics between the two vendor teams (onsite and offshore) played a role equal to the dynamics between client onshore and vendor offshore teams that get the bulk of the attention in the literature.

Our research has made three main contributions to the state of research on IS failure and offshoring. Firstly, we have developed an exploratory model of OOSD project failure incorporating EWSs of failure, which helps us understand the process of OOSD project failure. The concept of EWSs of failure can be used in conjunction with the risk management framework in organizations that are involved in OOSD projects to reduce project failures. Secondly, we have distinguished the concept of EWSs found in the IS literature into early warning issues (EWI) and their easily noticeable early signals of failure. Early signals of failure helped us understand how project managers might be able to perceive the EWSs of failure that surface in early project stages. This work is among the first to analyze the team-level EWSs of failure extensively during the first 20 percent of the collaboration period between vendors and clients. Thirdly, we have identified and characterized the EWSs of failure in OOSD projects at the team level. The project context with its unique characteristics was found to provide information regarding the EWSs of failure (Williams et al. 2012).

The OOSD project failure model, together with the concept of EWSs of failure, can be used as a guideline by practitioners trying to understand the failure process in OOSD projects; this helps practitioners reduce offshore-specific risks. Schmidt et al. (2001) find that risks are perceived differently by project managers on different continents. The EWSs of failure identified through our research stem from India-centric project cases, which may of course limit their applicability. Nevertheless, most practitioners in OOSD projects could probably benefit from further addressing the EWSs in the categories of shared project execution structures and team collaboration. Organizational and professional values as well as the work practices of various organizations involved in the OOSD project could be taken into consideration in developing risk identification and management measures.

6. Management of EWSs of failure

6.1. Introduction

The offshore-specific risks of OOSD projects make them prone to failure, while at the same time making it difficult for project managers to perceive the existence of EWSs of failure. As the previous chapter pointed out, provided that the early warning signs resulting from the causes of failure issues can be detected in the first 20 percent of the project's cooperation between vendors and clients, they can be managed effectively to achieve the original project objectives. The detection of EWSs allows project managers to take the necessary measures to put the project back on track. On the other hand, failure to detect the EWSs leads to project issues that require attention. In the case of failed projects, the serious issues that call for the cancellation of projects are called failure issues. The EWSs of failure allow project managers to act based on predictions, and thus to manage the issues in a timely manner. Further, the existence of EWSs predicts failure issues that could result in project failure or cancellation.

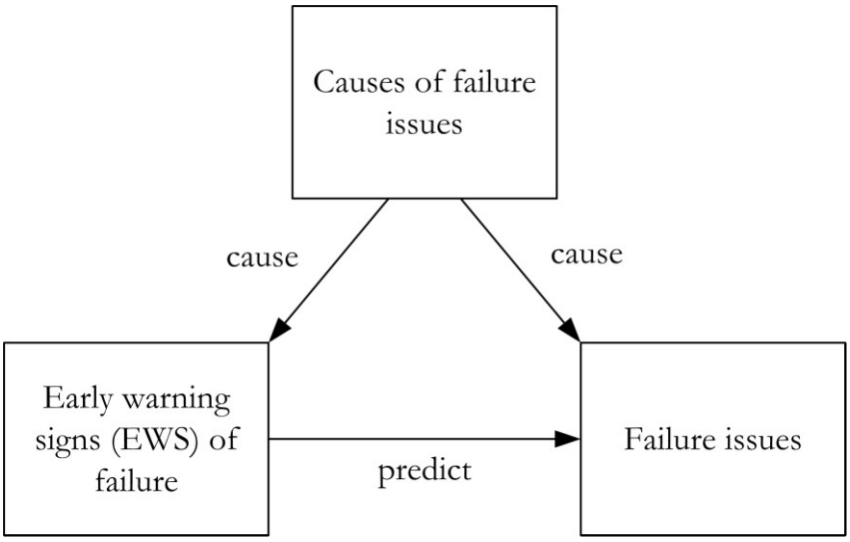

Figure 17: EWSs of failure leading to failure issues

The existence of EWSs of failure in OOSD projects has been confirmed by our research. Nevertheless, the ability to notice EWSs early in the project stages and the measures undertaken in OOSD projects to correct them have not been studied extensively. In

particular, there exists little empirical research regarding the management of perceived issues and the reasons behind the inability of project managers to act upon the EWSs (Williams et al. 2012). The reasons behind the failure to manage the perceived EWSs of failure are not well understood.

Managing the issues early in the project allows project managers to complete the project according to the original estimates. In this chapter, we study how project managers involved in OOSD projects manage the project issues in the early project phases[15]. We reiterate the research question formulated earlier:

How are the team-level early warning signs of failure managed by project managers in offshore-outsourced software development projects? Why are they not managed effectively?

6.2. Management stages of EWSs of failure

Our analysis of failed project cases (cf. section 3.4.2) showed that most project managers failed to act upon the EWSs of failure and thus were not able to save the project. Among the projects that were cancelled in the requirements analysis phase, in cases F and M the project managers noticed the inability of their organizations to engage in OOSD projects early enough and stopped the project. The cancellation of project case S happened due to the realization of the lack of business benefits to the organization in the requirements analysis phase. Most of the EWSs of failures were detected by project managers in our retrospective research; however, several factors seem to have hindered concrete actions based on the warnings. The EWSs were mostly noticed, and some of them were addressed, based on the experiences of the project managers.

The qualitative data analysis has resulted in patterns (Miles and Huberman 1984), which showed issues passing through four distinct stages among vendors and clients once the EWSs were detected during the project execution. These stages include monitoring for EWSs, detection of EWSs, acknowledgment of issues, and addressing issues (figure 18). The EWSs of failure that were managed in each stage and category are listed in appendix B. As the previous chapter notes, the EWSs of failure were found to be a pair of early

[15] Parts of this chapter have been published earlier in (Philip, Wende and Schwabe 2013c).

signals and an EWI. Each early signal that went on to become or contribute to an EWI was found to be at one of the management stages at any given time. Each EWS, if it was not managed in a timely manner, developed into a failure issue (cf. section 5.3) that caused project cancellation. Several failure factors affected the management of EWSs in each stage and eventually added to the causes of failure issues.

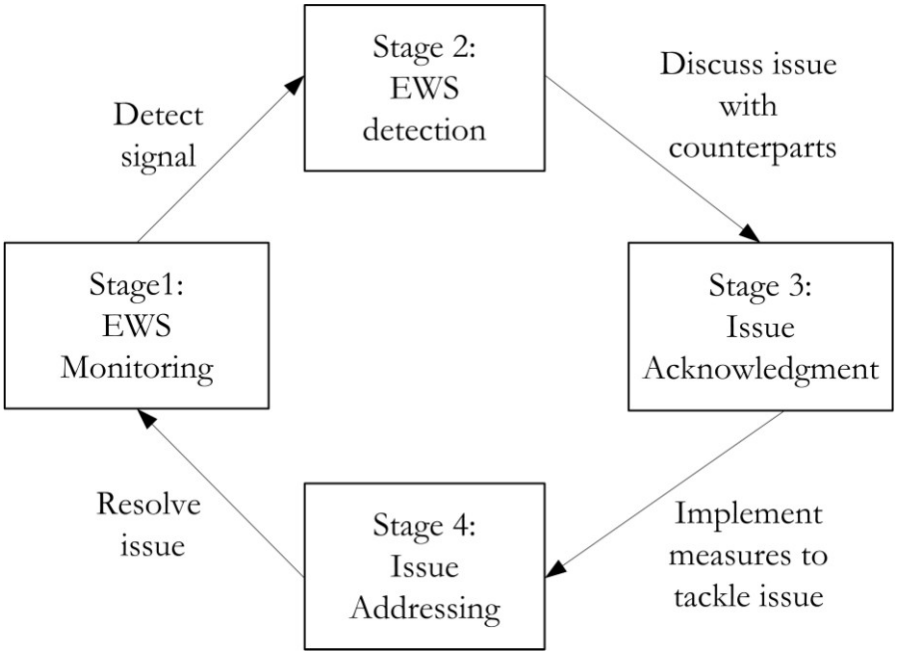

Figure 18: Management stages of the EWSs of failure

The early signals are detected during the monitoring stage. In order to consider them EWSs, the early signals and issues should be detected during the early 20 percent of the project's collaboration between vendors and clients. The later stages, acknowledgment and addressing issues, do not necessarily fall within the early 20 percent. Nevertheless, in order to manage the issues in a timely manner and to execute the project according to the original estimates, the issues need to be solved close to the early 20 percent (Kappelman, McKeeman and Zhang 2006). Further, early detection and resolution of issues will leave more room for the execution of planned as well as unplanned tasks. The timeline boundaries of the acknowledgment and addressing stages were found to be mostly after the early 20 percent of the project collaboration. Once the issue has been managed in the addressing stage, the project returns to the EWS monitoring stage with respect to issue management.

Each ascending issue management stage was found to be increasingly difficult to reach. The higher stages could be viewed as reaching a higher maturity level regarding the management of individual issues. Unless efforts are initiated to proceed to the higher stages, the issues could be considered as managed only until that stage. Several failure factors were found to affect the management of each EWS stage. In the following sections, we discuss each management stage and the failure to manage EWSs in each stage.

6.2.1. Monitoring for EWSs

The monitoring stage prepares project managers to search for early signals of failure during the project execution. Ansoff (1984, p. 355) recommends that managers be alert and "listen with their ears 'close to the ground'" in order to detect early weak signals. As humans can only selectively perceive and process information coming through (Loosemore 2000) during the project execution, our cognitive bias and preparedness provide the direction for detecting and managing issues (Watkins and Bazerman 2003). Humans also possess limited capability for paying attention to the consequences of issues and actions, which results in our "bounded capacity to be rational" (Ocasio 1998, p. 187). Issues develop as the discrepancies between the existing and desired states becomes wider (Billings, Milburn and Schaalman 1980). Therefore, project managers need to have a clear conception of the project context and the expected project state during the execution.

Keil and Montealegre (2000) suggested that negative feedback and external pressure could be considered warning signs. However, these signs need to be followed up in order to manage them. Other concrete measures to detect EWSs, suggested by Williams et al. (2012), include check lists, balanced scorecards, and "traffic lights." Our data analysis of the failed cases shows that 27 percent[16] of the early signals identified by project managers in retrospect were not detected during the project. Table 14 lists the failure factors that

[16] All percentage figures given in this chapter were calculated using values that are provided in the tables presented in appendix B.

led to the inability to detect EWSs during the monitoring stage, along with their respective project cases. In what follows, we discuss the circumstances that led to the difficulties in detection.

Failure factors	Project cases
Missing risk monitoring mechanisms	E, G
Hands-off approach	C, F, H, P, R
Lack of intensive collaboration between clients and vendors	K
Underestimation of offshore project context	D, N
Optimism regarding delivery	L

Table 14: Monitoring stage and failure factors

Deficient risk monitoring mechanisms will reduce the preparedness of project managers to deal with the early warnings that appear in projects. The onshore vendor project manager of case E noted the failure reason in detecting issues during the early phases: "It was a bit late. If we had noticed the problem before then we had more chances to maybe save the project. Because in that case we might be in a position to tell to the client openly that yes, this is a problem. Which we did afterwards as well, but then we might have been in a good position to give more solutions to that client during the first 20% of the project collaboration." Lack of risk monitoring reduces the chances of recognizing issues and thus leads to the inability to provide appropriate responses (Leidner, Pan and Pan 2009). Loosemore (2000) emphasizes the necessity of gathering intelligence early in the project in order to be able to offer swift responses in crisis management.

Another failure factor was the "hands-off" approach adopted by several clients – that is, blindly trusting vendors to deliver the systems. Unless the client takes an active interest in managing the project execution from the early stages on, vendors may take advantage of the information asymmetry that exists between the actors. The client project manager of case H admitted his failure in managing the project using the following words: "Of course, the vendor did fail, terribly and miserably, but I would put the blame squarely on our side because we failed in managing. We took a hands off approach because our priority was obviously at different point in time differently. So we failed to manage it and monitor the progress of the project and in the end we suffered it." Project case R was

also canceled as the EWSs remained unnoticed and unaddressed by the client who was in a "hands-off" mode. The client, who is from the airline industry, trusted the Indian vendor to deliver and never bothered to check the technical aspects of the project. The client believed the promises of the marketing and sales personnel of the vendor team and simply expected the final system to be delivered; in the end, the system never went live, as the software quality was too poor.

Inadequate collaboration between the business and IT teams of clients and vendors in case K led to many issues that went undetected. The organizational structures in these teams resulted in structures in which neither side took responsibility for project development. This resulted in a situation in which warnings regarding team collaboration could not be anticipated (Watkins and Bazerman 2003) by the project managers. Underestimating the complexities involved in the offshore project context may put the project execution at risk. Project cases D and N suffered from the difficulties of synchronizing project knowledge with the offshore team, which became apparent only later in the project. Snowden and Boone (2007) differentiate context into simple (known knowns), complicated (known unknowns), complex (unknown unknowns) and chaotic (unknowables). Based on the context information from failed project cases, we found either complicated or complex contexts, in which "unknowns" dominated. Further, especially with lacking project experience, the context remains complex for project managers. With increasing experience in onshore-offshore projects, the context can reach the complicated category.

Optimism regarding keeping agreed milestones by the vendor resulted in poor deliverables with slipping milestones in project case L. Instead of reviewing the project together with the client, the vendor manager further agreed to deliver according to the original estimates in order not to cause displeasure to the American client. After three slipped milestones, the American client manager decided to cancel the project. Optimism bias is known as a psychological barrier that affects many projects (Flyvbjerg, Holm and Buhl 2002). Klakegg et al. (2010) note that optimism is one of the key barriers in detecting EWSs during the project execution. This results from the propensity of optimism to inhibit the project managers' ability to look for warning signs. Williams et al.

(2012, p. 49) describe the optimism tendency as the "the trust in the project's ability to run faster and fix the problems, and it will be fine in the end." Only project assessments can reveal how far behind the targets the current state stands. Project managers cannot always discern the direction in which a project is heading, especially when many factors are beyond their control (Keil et al. 1998).

6.2.2. Detection of EWSs

The EWSs of failure were noticed by project managers in the failed projects in one way or another, but without the accompanying realization that they could eventually lead to failure. In retrospect, project managers detected 73 percent of the early signals of failure during the project execution, while the rest remained undetected in this phase. Once the early signals are detected, the EWSs need to be identified by checking the early signals and their early warning issues in this stage. However, detection of early signals and the warning issue they refer to does not necessarily prompt project managers to overcome these issues, due to difficulties in collaboration between vendors and clients. Among the six EWS categories, only the team-building efforts category (see chapter 5) has more undetected than detected early signals during the project execution (see appendix B). The early warning issue of missing team-building exercises by client and vendor, especially, went completely unnoticed in all projects. This could point to insufficient focus on team building efforts during the early project phases. Failure factors that hindered further actions in the detection stage, along with their respective project cases, are given in table 15.

Failure factors	Project cases
Lack of intensive collaboration between vendor onsite and offshore teams	B
Assuring normality or continuity	B, I
Trusting the reputable vendor	C, P
Keep future business prospects intact	Q
Missing onshore-offshore project experience	M
Tight schedule	J

Table 15: Detection stage and failure factors

The client project manager of case B found that even though the issues were detected and discussed with the vendor manager, the underlying problem could not be solved by the client. The vendor organizations at onshore and offshore sites worked as independent organizations and did not collaborate effectively to solve the issues raised regarding the banking application. In the light of information asymmetries (Baiman 1990) in such organizational set-ups, a certain level of trust on the part of the client in the assurances of normality given by the vendor is necessary. Private information that only the vendor (agent) has access to leaves the client (principal) in an imperfect monitoring situation (Keil, Mann and Rai 2000) that cannot be solved quickly in offshore projects. Further, the reputation of vendors also invited client trust in cases C and P, leading clients to carry on with the project even after the issues were noted. Flyvbjerg, Holm and Buhl (2002) point to optimism bias as the psychological barrier that needs to be checked in order to effectively manage the issues.

Another failure factor in managing the detected issues further was the interest in keeping future business prospects intact. This situation will lead to a "mum-effect" (Keil and Robey 2001) among project managers, which is the reluctance to admit project problems openly. In case Q, both the vendor and the client lacked interest in taking up the issues regarding incompatible technical design. The project manager described the situation that resulted as follows: "From a vendor perspective when the first concerns were raised there was a massive - I'll use a technical term - freak out on the customer side. And on the vendor side. I was on the vendor side raising concerns. Both parties immediately became polarized. It was in the context of a much larger additional transaction covering overall outsourcing engagement. So both parties wanted the noise to go away quickly for the sake of a much larger transaction." Paradoxically, long-term relationships could force project managers to avoid any strains on the relationship.

Lacking onshore-offshore project coordination experience on the part of the project manager forced the cancellation of project M, which happened to be one of the first offshore projects in the client organization. Although the manager could pick up the early warning issue of lack of team coordination, it could not be acted upon further as there was a lack of support in the organization. In project J, tight schedules given by the

management resulted in project cancellation even when the early warning issues were picked up. The vendor's failure to see the project context and prioritize the tasks forced the client to look for an alternative work force that was not readily available from the vendor organization, contradicting initial promises. Williams (2012) finds that time pressure can lead to a situation where EWSs cannot be detected so they can be acted upon effectively.

6.2.3. Acknowledgment of issues

Once the early signals and early warning issues are detected, both the vendors and clients need to acknowledge the existence of issues and the subsequent necessity to address them. Mutual admission of issues expresses the willingness to resolve them (Havelka and Rajkumar 2006). This results in a shared understanding of warning between the partners (Leidner, Pan and Pan 2009). Our data analysis shows that only 33 percent of the detected early signals were acknowledged between the vendor and client teams, which shows the difficulty of reaching this stage. Table 16 lists the factors, along with their respective project cases, that led to the failure to further address the issues acknowledged between clients and vendors.

Failure factors	Project cases
Client concerns ignored	A
Inadequate onshore-offshore project experience	B

Table 16: Acknowledgment stage and failure factors

Although the client manager in case A expressed his concerns to the vendor manager, the latter never acknowledged them as a problem that needed to be addressed: "And the delivery management was always giving them rosy pictures saying that, 'There are some problems, but it's okay we'll take control of it.' So I think the major problem here was that if they took our solutions more seriously, basically the voice of the customer is quite important, then they would have seen the problems much earlier themselves." Keil and Robey (2001) have noted the "deaf-effect" of managers regarding concerns raised about risks in runaway projects. The cognitive bias of the human mind leads managers to underestimate and ignore many issues; humans tend to see the things as they would like

them to be rather than acknowledging their actual state (Watkins and Bazerman 2003). The optimism of vendors also serves as a psychological barrier and leads to underestimating the situation (Flyvbjerg, Holm and Buhl 2002).

The client project manager of case B noted the complications regarding acknowledging issues among vendors as follows: "It was only possible to escalate and to bring the facts, and if they say, 'Everything is under control, there is no issue' and what you can see is only some, maybe clouds outside, but there is no rain. Okay, hopefully it's true, but again, it was not true." Information asymmetry around the issues (Keil, Mann and Rai 2000) raised puts the client manager in a difficult position, as he cannot control the situation in the offshore site. The experiences of the project manager working with the vendor organization also played a role since he was not aware of the organizational and professional culture in the offshore context. The mum-effect of vendors also explains the lack of open admission of problems both at offshore and onshore sites.

There seem to exist barriers to acknowledging EWIs that are particularly difficult to surmount in the onshore-offshore context, as Indian managers seem to be culturally reluctant to admit project problems openly. Indian project managers were alleged by clients to be non-transparent in their communication as a result of their organizational culture. Mutual acknowledgment of issues and the determination to resolve them (Keil and Montealegre 2000; Havelka and Rajkumar 2006) sets the stage to address them in the next step.

6.2.4. Addressing issues

Agreement by the vendor or the client to solve the issue, along with taking measures to find solutions, forms the next stage in managing EWSs of failure. This could involve finding the root cause of the problems, which could take a substantial amount of time. Among the early signals detected in the first stage, only 18 percent were addressed in this stage. This shows how difficult it becomes to solve issues between vendors and clients during project execution. Case studies by Klakegg et al. (2010) also suggest that EWSs that were detected during the project could not be acted upon to make use of the project efforts. Once the issue is resolved by taking appropriate measures, it can be regarded as

successfully managed. A resolved issue can be further monitored for early signals in the monitoring stage, and thus the management of EWSs forms a cyclical model. Failure factors that hindered the addressing of issues, along with their respective project cases, are listed in table 17.

Failure factors	Project cases
Late intervention	A
Inadequate onshore-offshore project experience	O
Waterfall methodology	R

Table 17: Addressing stage and failure factors

The issues need to be prioritized based on the state of knowledge, impact, and urgency in order to leave adequate response time for resolution (Ansoff 1984). Late addressing of issues could make the efforts that go into detecting the EWSs unrewarding. This situation was experienced by the client project manager of case A who noted: "The delivery management would then say that, 'Look these are just starting problems and we are just…we'll go into a more, let's say, stable phase. It's just this kind of inception problems that we have.' " Although the problems regarding team member competencies were acknowledged by both sides, the resolution – introducing new members – came too late for the client to finish according to the original plans. The sales and marketing team of the vendor presented an optimistic picture of offshore execution without providing a smooth transition to the delivery team, which resulted in contract breaches. This late intervention by the Indian vendor might be attributable to the timeless vision of time held by Indians as opposed to the Western view of time as clock time. Saunders, Van Slyke and Vogel (2004) note differences regarding time perception among different cultures, which could affect the team performance.

Inadequate onshore-offshore project experience seems to have played a major role in the inability to solve most issues. An experienced offshore project manager in case O, who found himself in a situation that made it difficult for him to address the issues, noted the following: "Most of the people don't notice these [issues], that's where the failure happens. And fortunately in a lot of failed projects that I've seen, because of the past

experience I was able to notice these problems quite early, the lack of collaboration and lack of processes. Even if the project during the setup time could have looked at the best practices of the last project, they could learn from the material. They don't need to reinvent the whole wheel. They can just take a lot of things and tailor themselves to the project needs. But this was missing in the project. And this was noticed quite early in the project, and that's why we took some of the actions. But I would say that they could have done better in terms of managing or establishing those types of detailed processes between the team in terms of how … we should bring it." Case studies by Klakegg et al. (2010) show that the experience and competencies of project managers play a role in detecting and addressing EWSs during the project execution.

Havelka and Rajkumar (2006) propose an immediate recovery stage, which could take place at any point of the troubled project. By contrast, we found that addressing issues in a timely manner closer to the first 20 percent of the project's cooperation period between the vendor and client was important if the project was to benefit from warning signs management. Watkins and Bazerman (2003) suggest that failure to recognize and prioritize risks and mobilize resources accordingly results in predictable surprises that could have been anticipated. The management stages of EWSs show that a clear understanding of the onshore-offshore project environment plays a major role in avoiding such predictable surprises.

Another factor that hindered the early addressing of issues was the use of waterfall methodology, in which the deliverables can only be verified late (by the end of each phase). This problem was mentioned only by the project manager of case R, although all cases but case Q used this methodology. Many projects could not be managed using EWSs, as they applied waterfall methodology instead of incremental methodologies, which, although more costly, can result in faster verification of deliverables. The waterfall methodology continues to be the most popular methodology of systems development because of its clear delineation of the activities to be executed onshore and offshore (Sakthivel 2012). Information asymmetries between clients and vendors are high in the waterfall model compared to agile methodologies such as the iterative model and extreme programming, as vendors' behavior can be ascertained by clients only after the delivery of

artifacts in each phase (Kataja and Tuunanen 2006). Without referring to offshore development, the Standish Group's (2010) CHAOS report noted that among the projects it studied from 1994 to 2008, 43% using agile development methodologies had been successful (12% failures and 45% challenged) as opposed to 26% those using successful waterfall development (15% failures and 59% challenged).

6.3. Summary

In this chapter, we investigated how project managers perceive and manage the presence of EWSs of failure in offshore-outsourced software development (OOSD) projects. We developed a four-stage model for the management of EWSs of failure that can be applied in domestic as well as offshore outsourcing projects. The four stages are: monitoring for EWSs, detection of EWSs, acknowledgment of issues, and addressing the issues. We characterized the difficulties of managing EWSs in each management stage. The monitoring stage itself faces several difficulties in detecting the EWSs. Each stage of issue management was found to be increasingly difficult to reach during the early project stage, resulting in many issues not being managed in the failed project cases that we analyzed. In retrospect, of the identified early signals of issues in all failed projects, only 13 percent reached the final stage of EWS management, namely, addressing issues.

The distinct project characteristics of the OOSD projects cause specific risks in the onshore-offshore project environment; in failed project, these risks seem to be underestimated. Our research points to inadequate onshore-offshore project experience as a major factor contributing to the failure to manage the early warning issues that were detected. We also found that although most issues were detected during the project execution, preparedness to manage them in terms of established risk management measures was a common factor in preventing the management of issues in a timely manner. As IS projects are unique and dynamic in terms of their context and execution (Cule et al. 2000), they also require unique measures to resolve the issues. Recent studies on EWSs in complex projects (Klakegg et al. 2010; Williams et al. 2012) show that EWSs were less useful in complex projects as the complex issues remain uncovered during the project execution. However, the failed project cases that we studied were also mostly complex, and yet some issues in them were managed with appropriate risk management

measure. In contrast to the failed projects analyzed for this thesis, project managers also talked about a successful OOSD project, in which the relevant issues that led to cancellation in failed projects were successfully managed.

Among the six EWS categories that we analyzed, the category of project team building efforts stands out as the only one where less than half of the identified EWSs of failures were detected during the project. The early warning issue of missing team-building exercises by client and vendor was not detected in any of the projects. This could point to the difficulty of constructing a project team out of client, vendor onshore, and vendor offshore teams and maintaining them across organizations and countries.

Our explorative data further suggests that the waterfall methodology with its late deliverables may not be the most suitable methodology to deploy EWS detection mechanism. Waterfall methodology was the predominant methodology used in all failed projects, except in case Q. On the other hand, whether agile methodology, with its quicker deliverables in several iterations, might be more applicable to detecting EWSs in the offshore-outsourced scenario remains to be verified.

We have made two main contributions to IS failure and project management research in this chapter. Firstly, we have developed a cyclic four-stage management model to detect issues between clients and vendors and to successfully manage them. This process model can be applied by practitioners to detect and assess early warning issues in outsourcing projects. Secondly, we have characterized the failure factors in each management stage. We found that the project managers required more experience and understanding of the offshore-outsourced environment in order to detect the warning issues and address them together with their offshore or onshore counterparts. This research also stands among the few works to have analyzed OOSD project failures, and the even fewer that specifically address the early project stages of OOSD projects.

7. Conclusion

7.1. Research limitations

Our exploratory research has several limitations; however, we believe that this exploratory work has shed light on offshore-outsourced project failures, a relatively uncharted field of investigation. The India-centricity of our research is the primary weakness of this work, as it causes our data to be limited by the homogenous organizational culture on the vendor side. Thus, the research results may not be entirely generalizable (Glick et al. 1990). However, we decided to anchor the data to Indian development projects as an exploratory endeavor. India was chosen because it is the most dominant IT offshoring nation (Oshri, Kotlarsky and Willcocks 2011). Further research could include other software development countries to improve the generalizability of the results.

We chose project managers as the key informants, as they are the most knowledgeable persons involved in failed projects. That choice, of course, also limits our research: triangulation of failure data in projects with other project team members or the vendor or client counterparts could have improved the validity of our results. However, given the sensitivity of failure research, getting project managers to agree to tape-recorded interviews was difficult enough; for a researcher who is an outsider to the project organizations, being able to follow up failed projects into other parts of the organization proved an impossible task. Another potential limitation introduced by the interviews is that retrospective narration of project details is prone to recollection errors. In order to minimize the recollection errors (Glick et al. 1990), we asked the project managers to focus on major events and issues involved in two major projects in their career, one failed and one successful, and to choose projects that could be narrated with greater ease than other projects.

7.2. Research implications

This research aimed to study the partially-known phenomenon of OOSD project failure from project managers' perspective with the goal of providing project managers with predictive tools to recognize circumstances that warn of failure as well as offering a

theoretical account of failures. By formulating theories about how to predict failure situations and EWSs of failures, we offer project managers guidance regarding realizing the benefits that the implementation of offshore-outsourced projects originally intended to provide. The insights from this exploratory research offer academics as well as practitioners a better theoretical and managerial understanding of offshore-outsourced project failures. Research on failures remains rare in the IS research literature because of the sensitivity of the topic: few organizations are willing to openly talk about failures, since doing so could affect their image and thus their public relations (Sparrow 2003). Publicizing offshore-outsourcing failures, in particular, could lead to a backlash from the public in the outsourcing countries.

The first research question took up the unique team-level aspects of OOSD projects that predict project failures and how they predict failures. While the literature has identified several aspects, such as communication, coordination, organizational culture, and collaboration mechanisms, that are necessary for the successful completion of OOSD projects (e.g., Cramton 2001; Hinds, Liu and Lyon 2011; Sidhu and Volberda 2011), we found that the extent to which team-level (non)interaction predicts failures was far from clear. Researchers have identified cohesiveness and the capability of members to affect team performance within a single organization as important (e.g., Lakhanpal 1993; Hoegl and Gemuenden 2001), but research on the role that lack of cohesion in OOSD teams played in leading to failures was missing. At the same time, informal communication (Fabriek et al. 2008) as well as the cultural orientation of team members was known to affect team effectiveness (Karahanna, Evaristo and Srite 2005). We therefore proceeded to examine the relationship of cohesiveness, and team dynamics in OOSD projects.

The inherent complexity and uncertainty of software projects from the outset makes the early project stages the most critical in terms of avoiding failures (Brooks 1995; Hoch et al. 2000). This is because early mistakes could become costly in the later stages (Flowers 1996; Ewusi-Mensah 2003). Analyzing the unique team-level aspects that lead to project failures aids in the identification of the EWSs of failure and thus addresses this problem.

The literature provided a number of valuable insights regarding OOSD projects. Iacovou and Nakatsu (2008) noted that the successful management of offshore projects requires better than ordinary project management skills from project managers, because the risks involved in offshore-outsourced projects are greater and more numerous than in domestic outsourced projects. IS failure research attributed major failures to organizational context, management processes, and project team composition (e.g., Lucas 1975; Ewusi-Mensah and Przasnyski 1991; Flowers 1996; Yeo 2002). Further, the TIP theory offered an elegant theoretical framework for explaining issues in a project within a single organization (McGrath 1991). However, failures in OOSD projects that involve multiple organizations could not be explained or predicted using extant theories. The scanty research on IS failures in offshore projects demanded an investigation of whether the aspects known to affect offshore projects, which were known from a perspective different from that of failure research, also predict failures.

We identified six team-level aspects that predict failures, which include offshore-specific and non-offshore specific aspects. Offshore-specific aspects are unique to OOSD projects and require special attention. They include project team-building efforts, team collaboration, awareness of the shared work context, and onshore-offshore team coordination. Non-offshore specific aspects are not unique to OOSD projects, but they do require more attention in offshore environment than in domestic software outsourcing projects. They include shared project execution structures and team member competencies. Several authors have discussed these aspects in the literature as affecting project performance in project contexts other than the offshore-outsourced context, that is, in domestic outsourcing or captive offshoring. However, our analysis of those aspects established their relevance in avoiding project failures, grounded in the empirical data we gathered about failures. They were also relevant to identifying the EWSs of failure in early project stages.

Our theoretical propositions regarding team performance and project failures argue that the onshore and offshore teams from the vendor and client sides need to work as an integrated project team in order to avoid failures. Team-level analysis of project failures that integrates different teams is the major contribution of our theoretical analysis.

However, the extent to which team-level aspects affect the overall project outcome could not be established in this study; for that, further research is required. Our theory of multiple teams at offshore and onshore sites involved in OOSD projects on both vendor and client sides demanded that we address inter-organizational and multi-national project cooperation, something that was not addressed satisfactorily in the literature. Our theory of multiple teams is fairly well able to predict project development failures in the OOSD project context. Our theory also helps project managers consider the offshore-outsourced team-level aspects that define the project context risk while engaging in OOSD projects.

The second research question focused on identifying the team-level EWSs of failures specific to OOSD projects and to explore how project managers can perceive them. Klakegg et al. (2010) called for industry/project specific studies to find out the nature of EWSs in each industry/project. This call warranted paying particular attention to the software industry because the visibility of EWSs is determined by their intensity, duration, and subtlety (Loosemore 2000); these vary in the software development industry compared to other industries like construction. The imperfect control in offshore-outsourced projects and the intangible nature of software development lead to relatively low visibility of EWSs, and the software industry is characterized by high project failures. Therefore, the identification of EWSs provides a managerial tool for understanding the issues that lead to failures – a tool that is particularly important in offshore-outsourced software projects.

Few studies regarding EWSs in IS research (Havelka and Rajkumar 2006; Kappelman, McKeeman and Zhang 2006; Philip, Schwabe and Wende 2010) called for a deeper analysis of the EWSs to understand how project managers, who are closer to the project than other stakeholders, notice the EWSs in failed projects. We identified EWSs of failures in six team-level aspects that were responsible for project failures. Our study laid an exploratory foundation for an improved understanding the nature of EWSs by discovering a dual composition – early signals and early warning issues of failure – that can be used to institutionalize an early warning mechanism to act upon in software projects (Keil and Montealegre 2000). The deployment of an issue management

instrument that involves EWSs would be particularly helpful in outsourced projects, as these involve greater risks than in-house ones. The offshore-outsourced scenario with its offshore-specific risks, in particular, could benefit from the management of EWSs.

We concentrated on issues in the first 20 percent of project's calendar, because early detection is important if one is to allow enough time to take corrective measures and complete the project as originally planned. Information regarding the probability and impact of potential issues are traditionally handled by risk management measures (Nikander 2002). As EWSs provide advance information regarding risks, an early risk perception instrument could be applied in conjunction with project assessment measures, such as project reviews, project health checks, and benchmarking (Williams et al. 2012). As a concrete measure, the identified EWSs of failure from this work could be used as check list (Boehm 1991; Williams et al. 2012) for early risk perception.

The EWSs of failure are primarily meant as a predictive instrument, rather than providing a causal explanation of failures, since the utility of a predictive instrument is better in an exploratory field where research is scarce. Moreover, as Williams et al. (2012) note, the behavioral complexities of team members mean that the causal relationships between the causes of failures and EWSs are less obvious. Our exploratory model of OOSD project failures, which incorporates EWSs of failure, provides an overview of the failure process. This model also focuses on the predictive power of theory rather than on providing well-developed causal explanations of each construct (Gregor 2006).

The third research question investigated in a exploratory manner how the team-level EWSs of failure are managed by project managers in OOSD projects and the reasons behind the failure to manage them. Williams et al. (2012) found that even when the issues that lead to failure are detected in the early stages, they may not always be acted upon. The reasons for the failure to act upon EWS, we thought, merited deeper analysis in order to understand the nature of EWSs in offshore projects. Some of the reasons for this failure posited in existing research included the uncertainty of projects from the outset (Hoch et al. 2000; Klakegg et al. 2010), understanding complexities, and mastering interpersonal effects (Klakegg et al. 2010). In this context, agency theory was also interesting, as it explained the difficulties involved in monitoring the actions and

behaviors of actors in distant places and thus the inherent difficulty of detecting EWSs early enough, and suggested that clients need to put more effort into reducing information asymmetries. Our analysis has shown that as the warning signals of issues become stronger (Ansoff 1975), they will be noticeable first as early signals and then as EWIs, and they passed through different stages of management.

We laid an exploratory foundation by developing a four-stage model for the management of EWSs of failure. The four stages include monitoring for EWSs, detection of EWSs, acknowledgement of issues, and addressing the issues; this cyclical model to manage issues could also be applied for domestic outsourcing projects as the client and vendor are the main actors in the management of the EWSs. We characterized the difficulties of managing EWSs in each management stage and found that only 13 percent of the identified early signals of failures reached the final stage of management. The EWSs in the category of project team building efforts, in particular, were rarely detected in failed projects, which points to the difficulty of establishing and maintaining teams across client and vendor organizations.

We concentrated on EWSs that were identified during the early 20 percent of project's collaboration between clients and vendors. Even though the monitoring and detection of EWSs were analyzed from the early 20 percent, the later management stages mostly did not fall within project's early 20 percent. This could also point to the late resolution of issues in failed projects that led to cancellation. In order to manage issues in a timely manner and achieve the intended benefits, the issues need to be addressed closer to the early 20 percent of project's calendar. We also found that most projects were undertaken using the waterfall methodology that mostly provides deliverables too late to be efficiently managed within project's early 20 percent. However, the feasibility of agile methodology for large projects in terms of economics in offshore projects, as well as the success of EWSs in projects involving agile methodology, still need to be established.

7.3. Practical implications

Our study of project failures from the OOSD project team perspective – consisting of client onshore, vendor offshore, and vendor onshore teams – has several managerial

implications. We provide managerial tools to predict project failures in OOSD projects as well as predictive models regarding the perception and management of EWSs of failure. These tools could guide managerial actions to improve the project success in OOSD projects. We propose that team members from the client and vendor sides have to realize the need to establish an integrated project team and to work towards it in order to avoid failures. This would mean that each team would need to understand the national, organizational, and professional cultures of the other teams in different countries in order for the project team to develop a shared understanding and shared work practices. The team development between vendor onshore and vendor offshore members is especially overlooked in offshore projects (Vlaar, van Fenema and Tiwari 2008).

Our differentiation of the EWSs of failures into early signals and early warning issues could better allow project managers to detect the EWSs of failure and take corrective measures to rectify the mistakes. This is particularly relevant for offshore-outsourced projects that are exposed to more risks than domestic outsourcing projects. Further, the exploratory model of OOSD project failure, incorporating the EWSs of failure, can be applied by managers to understanding the relations between the EWSs and issues that lead to failure. Among the six categories of EWSs developed in our research, the categories of shared project execution structures and team collaboration related to organizational practices and national values could be further adapted to the organizational settings and national differences to monitor for the EWSs in projects. This is because project risks are perceived differently by project managers on different continents (Schmidt et al. 2001).

We found that each management stage of an EWS was increasingly difficult to reach, as the stages involved require interactions between vendors and clients to manage the EWSs. We also concluded that the lack of adequate onshore-offshore project experience was a major factor in the failure to manage EWSs. Further, the waterfall methodology has established itself as the predominant development methodology in offshore projects because of its clear delineation of activities at offshore and onshore locations – yet our exploratory research showed that this very methodology, in which outputs are delivered

by the end of each phase, is at the core of project managers' inability to act upon EWSs in a timely manner.

7.4. Future research directions

The EWSs of failure were identified from a relatively small group consisting of 19 project managers. Our research has served the exploratory purpose of establishing the existence of EWSs in the offshore-outsourced context. This existence could be researched further by testing the identified EWSs using a broad survey among project managers involved in OOSD projects. Our theoretical propositions regarding OOSD projects, in turn, could be tested using a larger data set of failed projects. Further, the management stages of EWSs in the early project stages could also be tested using such a survey. An important aspect in that survey would be the verification of the usefulness and effectiveness of EWSs in the onshore-offshore project context using successful and failed projects. Our research has indicated that several issues could be managed using the management model of EWSs. The extent to which offshore-specific risks influence the effectiveness of the early warning mechanisms could be explored as well.

We have relied on project managers from the vendor and client sides, using interviews as a data collection method to explore the early stages of OOSD projects. Unfortunately, we have had to limit ourselves to one side of the failure cases in our research, because failure research remains a sensitive topic and, therefore, research involving both vendors and clients is an extremely difficult endeavor. Should practitioners and researchers succeed in establishing trust and convincing clients as well as vendors of the benefits of conducting research covering both sides, such case study research would shed valuable light on the dynamics behind client, vendor offshore and vendor onshore teams. The processes behind project failures could be better understood through case study research, which would also provide triangulation opportunities that would improve the validity of qualitative research. In the absence of case studies, we contend that using interviews about failed project cases as a data collection approach is the second best option available for conducting failure research, which provided more breadth than depth.

As our focus in the present research was on offering a predictive tool regarding project failures, we did not analyze further casual relationships that explain team development. This include the relationships among the higher categories of team initiation, team interactions and team moderators, and their sub-categories. A theory of explanation (Gregor 2006) could be developed further by expanding the above categories, provided both the vendor and client agreed to be part of a research. The OOSD project failure model could be further extended by providing well-developed causal explanations between the constructs. Additional interviews or case studies could help establish the causal relationships among categories. Analysis of inter-organizational and professional work practices as well as the cultural negotiations that take place between the teams involved could be fruitful future directions to take to advance causal theoretical models. To better understand team development, an interesting approach would be to examine it further in terms of the in- and out-group phenomenon (Sidhu and Volberda 2011), which investigates how group members do or do not become part of the group.

Even though we focused our research on failed projects, we also asked project managers to narrate about one successful project to contrast the distinctions between the failed and successful projects. However, we focused more on failed projects in interviews as a result of our objective to develop predictive theories regarding OOSD project failures. An equal depth of focus on successful projects would ensure that underlying causal relationships among various constructs can be established.

Our research has mostly concentrated on hard issues in order to elicit EWSs of failure that can be measured during the project. EWSs could also appear as soft issues that are identified using gut feelings. Assessment of soft issues requires in-depth experience and a thorough understanding of the project environment (Williams et al. 2012). Although we evaluated the experiences of project managers in terms of IT, project management, and offshore project management experiences, we could not establish a direct link between their experiences and their ability to notice soft issues in OOSD projects. Research into soft issues requires a deeper analysis of interpersonal effects across organizational and national boundaries. The extent to which such capabilities affect project managers' ability and maturity to execute OOSD project will be of interest to practitioners.

References

Abdel-Hamid, T. K. and Madnick, S. E. 1990, 'The elusive silver lining: how we fail to learn from failure in software development', *Sloan Management Review*, 32(1), 39-48.

Ackoff, R. L. 1994, 'It's a mistake!', *Systemic Practice and Action Research*, 7(1), 3-7.

Agarwal, N. and Rathod, U. 2006, 'Defining 'success' for software projects: An exploratory revelation', *International Journal of Project Management*, 24(4), 358-370.

Amit, R. and Schoemaker, P. J. H. 1993, 'Strategic assets and organizational rent', *Strategic Management Journal*, 14(1), 33-46.

Ansoff, H. I. 1975, 'Managing strategic surprise by response to weak signals', *California Management Review*, 18(2), 21-33.

Ansoff, H. I. 1984, *Implanting strategic management*, Prentice Hall, New York.

Applegate, L. M., Austin, R. D. and Soule, D. L. 2009, *Corporate information strategy and management: text and cases*, 8th edn, McGraw-Hill, Irwin.

Apte, U. M. and Mason, R. O. 1995, 'Global disaggregation of information-intensive services', *Management Science*, 41(7), 1250-1262.

Apte, U. M., Sobol, M. G., Hanaoka, S., Shimada, T., Saarinen, T., Salmela, T. and Vepsalainen, A. P. J. 1997, 'IS outsourcing practices in the USA, Japan and Finland: a comparative study', *Journal of Information Technology*, 12(4), 289-304.

Aron, R. and Singh, J. V. 2005, 'Getting offshoring right', *Harvard Business Review*, 83(12), 135-143.

Aspray, W., Mayadas, F. and Vardi, M. Y. 2006, *Globalization and offshoring of software*, Association for Computing Machinery, New York.

Atkinson, R. 1999, 'Project management: cost, time and quality, two best guesses and a phenomenon, its time to accept other success criteria', *International Journal of Project Management*, 17(6), 337-342.

Baba, M. L., Gluesing, J., Ratner, H. and Wagner, K. H. 2004, 'The contexts of knowing: natural history of a globally distributed team', *Journal of Organizational Behavior*, 25(5), 547-587.

Bacharach, S. 1989, 'Organizational theories: some criteria for evaluation', *Academy of Management Review*, 14(4), 496-515.

Bagchi, K., Kirs, P. and Udo, G. 2007, '*A comparative analysis of offshored and onshored software development projects*', Proceedings of the 13th Americas Conference on Information Systems, Keystone.

Baiman, S. 1990, 'Agency research in managerial accounting: a second look', *Accounting, Organizations and Society*, 15(4), 341-371.

Balaji, S. and Ahuja, M. K. 2005, '*Critical team-level success factors of offshore outsourced projects: a knowledge integration perspective*', Proceedings of the 38th Hawaii International Conference on System Sciences, IEEE.

Barki, H., Rivard, S. and Talbot, J. 1993, 'Toward an assessment of software development risk', *Journal of Management Information Systems*, 10(2), 203-225.

Beck, R., Gregory, R. and Prifling, M. 2008, '*Cultural intelligence and project management interplay in IT offshore outsourcing projects*', Proceedings of the 29th International Conference on Information Systems, Paris.

Bettenhausen, K. L. 1991, 'Five years of groups research: what we have learned and what needs to be addressed', *Journal of Management*, 17(2), 345-381.

Beulen, E., Ribbers, P. and Roos, J. 2006, *Managing IT outsourcing governance in global partnerships*, Routledge, London.

Bhat, J. M., Gupta, M. and Murthy, S. N. 2006, 'Overcoming requirements engineering challenges: lessons from offshore outsourcing', *Software, IEEE*, 23(5), 38-44.

Billings, R. S., Milburn, T. W. and Schaalman, M. L. 1980, 'A model of crisis perception: a theoretical and empirical analysis', *Administrative Science Quarterly*, 25(2), 300-316.

Bochner, S. and Hesketh, B. 1994, 'Power distance, individualism/collectivism, and job-related attitudes in a culturally diverse work group', *Journal of Cross-Cultural Psychology*, 25(2), 233-257.

Boddie, J. 1986, *Crunch mode: building effective systems on a tight schedule*, Prentice-Hall, Upper Saddle River.

Boehm, B. 2000, 'Project termination doesn't equal project failure', *Computer*, 33(9), 94-96.

Boehm, B. W. 1991, 'Software risk management: principles and practices', *Software, IEEE*, 8(1), 32-41.

Boyatzis, R. E. 1998, *Transforming qualitative information: thematic analysis and code development*, Sage Publications, Thousand Oaks.

Brannen, M. Y. and Salk, J. E. 2000, 'Partnering across borders: negotiating organizational culture in a German-Japanese joint venture', *Human Relations*, 53(4), 451-487.

Brooks, F. P. 1987, 'No silver bullet: essence and accidents of software engineering', *Computer*, 20(4), 10-19.

Brooks, F. P. 1995, *The mythical man-month: essays on software engineering*, 2nd edn, Addison-Wesley, Boston.

Buchan, N. R., Croson, R. T. A. and Dawes, R. M. 2002, 'Swift neighbors and persistent strangers: a cross-cultural investigation of trust and reciprocity in social exchange', *American Journal of Sociology*, 108(1), 168-206.

Burke, K. and Chidambaram, L. 1999, 'How much bandwidth is enough? A longitudinal examination of media characteristics and group outcomes', *MIS Quarterly*, 23(4), 557-579.

Busi, M. and McIvor, R. 2008, 'Setting the outsourcing research agenda: the top-10 most urgent outsourcing areas', *Strategic Outsourcing: An International Journal*, 1(3), 185-197.

Cannon, J. A. 1994, 'Why IT applications succeed or fail: the interaction of technical and organizational factors', *Industrial and Commercial training*, 26(1), 10-15.

Carmel, E. 1999, *Global software teams: collaborating across borders and time zones*, Prentice Hall, Upper Saddle River.

Carmel, E. and Abbott, P. 2006, '*Configurations of global software development: offshore versus nearshore'*, Proceedings of the 2006 International Workshop on Global software Development for the Practitioner, New York, ACM.

Carmel, E. and Abbott, P. 2007, 'Why 'nearshore' means that distance matters', *Communications of the ACM*, 50(10), 40-46.

Carmel, E. and Agarwal, R. 2001, 'Tactical approaches for alleviating distance in global software development', *Software, IEEE*, 18(2), 22-29.

Carmel, E. and Tjia, P. 2005, *Offshoring information technology: sourcing and outsourcing to a global workforce*, Cambridge University Press, Cambridge.

Carter, T. 2006, 'Cheaper's not always better', viewed 27 February 2010, http://www.ddj.com/architect/184415486;jsessionid=MJHSAOYYPW4VQQSNDLOSKHSCJUNN2JVN?_requestid=1234833.

Casey, V. 2010, 'Virtual software team project management', *Journal of the Brazilian Computer Society*, 16(2), 83-96.

Chao, G. T. and Moon, H. 2005, 'The cultural mosaic: a metatheory for understanding the complexity of culture', *Journal of Applied Psychology*, 90(6), 1128.

Charmaz, K. 2005, 'Grounded theory in the 21st century', in *The Sage handbook of qualitative research*, 3rd edn, eds N. Denzin and Y. Lincoln, Sage Publications, Thousand Oaks.

Cohen, S. G. and Bailey, D. E. 1997, 'What makes teams work: group effectiveness research from the shop floor to the executive suite', *Journal of Management*, 23(3), 239-290.

Cole, A. 1995, 'KPMG 1995: runaway projects - causes and rffects', *Software World (UK)*, 26(3).

Corbin, J. and Strauss, A. 2008, *Basics of qualitative research: techniques and procedures for developing grounded theory*, 3rd edn, Sage Publications, Los Angeles.

Cramton, C. D. 2001, 'The mutual knowledge problem and its consequences for dispersed collaboration', *Organization Science*, 12(3), 346-371.

Cramton, C. D. and Webber, S. S. 2005, 'Relationships among geographic dispersion, team processes, and effectiveness in software development work teams', *Journal of Business Research*, 58(6), 758-765.

Cule, P., Schmidt, R., Lyytinen, K. and Keil, M. 2000, 'Strategies for heading off IS project failure', *Information Systems Management*, 17(2), 1-9.

Curtis, B., Krasner, H. and Iscoe, N. 1988, 'A field study of the software design process for large systems', *Communications of the ACM*, 31(11), 1268-1287.

Daft, R. L. and Lengel, R. H. 1986, 'Organizational information requirements, media richness and structural design', *Management Science*, 32(5), 554-571.

Damian, D. and Moitra, D. 2006, 'Guest editors' introduction: global software development: how far have we come?', *Software, IEEE*, 23(5), 17-19.

Damian, D. E. and Zowghi, D. 2003a, '*An insight into the interplay between culture, conflict and distance in globally distributed requirements negotiations*', Proceedings of the 36th Hawaii International Conference on System Sciences, IEEE.

Damian, D. E. and Zowghi, D. 2003b, 'Requirements engineering challenges in multi-site software development organisations', *Requirements Engineering*, 8(3), 149-160.

DeLone, W., Espinosa, J. A., Lee, G. and Carmel, E. 2005, '*Bridging global boundaries for IS project success*', Proceedings of the 38th Hawaii International Conference on System Sciences, IEEE.

DeLone, W. H. and McLean, E. R. 1992, 'Information systems success: the quest for the dependent variable', *Information Systems Research*, 3(1), 60-95.

Dennis, A. R., Fuller, R. M. and Valacich, J. S. 2008, 'Media, tasks, and communication processes: a theory of media synchronicity', *MIS Quarterly*, 32(3), 575-600.

Denzin, N. and Lincoln, Y. 2005, 'The discipline and practice of qualitative research', in *The Sage handbook of qualitative research*, 3rd edn, eds N. Denzin and Y. Lincoln, Sage publications, Thousand Oaks.

Dibbern, J. 2004, *The sourcing of application software services: empirical evidence of cultural, industry and functional differences*, Physica-Verlag, Heidelberg.

Dibbern, J., Goles, T., Hirschheim, R. and Jayatilaka, B. 2004, 'Information systems outsourcing: a survey and analysis of the literature', *ACM SIGMIS Database*, 35(4), 6-102.

Dibbern, J., Winkler, J. and Heinzl, A. 2008, 'Explaining variations in client extra costs between software projects offshored to India', *MIS Quarterly*, 32(2), 333-366.

Diener, E. 1979, 'Deindividuation, self-awareness, and disinhibition', *Journal of Personality and Social Psychology*, 37(7), 1160-1171.

Dourish, P. and Bellotti, V. 1992, '*Awareness and coordination in shared workspaces*', Proceedings of the 1992 ACM Conference on Computer-supported Cooperative Work, Toronto, ACM.

Drummond, H. and Hodgson, J. 2003, 'The chimpanzees' tea party: a new metaphor for project managers', *Journal of Information Technology*, 18(3), 151-158.

Earley, P. C. and Mosakowski, E. 2000, 'Creating hybrid team cultures: an empirical test of transnational team functioning', *Academy of Management Journal*, 43(1), 26-49.

Ebert, C. and De Neve, P. 2001, 'Surviving global software development', *Software, IEEE*, 18(2), 62-69.

Eby, L. T. and Dobbins, G. H. 1997, 'Collectivistic orientation in teams: an individual and group-level analysis', *Journal of Organizational Behavior*, 18(3), 275-295.

Edwards, H. K. and Sridhar, V. 2005, 'Analysis of software requirements engineering exercises in a global virtual team setup', *Journal of Global Information Management*, 13(2), 21-41.

Eisenhardt, K. M. 1989a, 'Agency theory: an assessment and review', *Academy of Management Review*, 14(1), 57-74.

Eisenhardt, K. M. 1989b, 'Building theories from case study research', *Academy of Management Review*, 14(4), 532-550.

El-Masri, M. and Rivard, S. 2010, '*Specifying the software project risk construct'*, Proceedings of the 16th Americas Conference on Information Systems, Lima.

Erickson, J. M. and Ranganathan, C. 2006, '*Project management capabilities: key to application development offshore outsourcing'*, Proceedings of the 39th Hawaii International Conference on System Sciences, IEEE.

Espinosa, J. A., Slaughter, S. A., Kraut, R. E. and Herbsleb, J. D. 2007, 'Team knowledge and coordination in geographically distributed software development', *Journal of Management Information Systems*, 24(1), 135-169.

Esterberg, K. G. 2002, *Qualitative methods in social research*, McGraw-Hill, Boston.

Ewusi-Mensah, K. 2003, *Software development failures: anatomy of abandoned projects*, MIT Press, Cambridge.

Ewusi-Mensah, K. and Przasnyski, Z. H. 1991, 'On information systems project abandonment: an exploratory study of organizational practices', *MIS Quarterly*, 15(1), 67-86.

Ewusi-Mensah, K. and Przasnyski, Z. H. 1994, 'Factors contributing to the abandonment of information systems development projects', *Journal of Information Technology*, 9(3), 185-201.

Fabriek, M., Brand, M., Brinkkemper, S., Harmsen, F. and Helms, R. 2008, '*Reasons for success and failure in offshore software development projects'*, Proceedings of the European Conference on Information systems, Galway.

Faraj, S. and Sproull, L. 2000, 'Coordinating expertise in software development teams', *Management Science*, 46(12), 1554-1568.

Flowers, S. 1996, *Software failure: management failure: amazing stories and cautionary tales*, John Wiley & Sons, Inc., New York.

Flyvbjerg, B., Holm, M. S. and Buhl, S. 2002, 'Underestimating costs in public works projects: error or lie?', *Journal of the American Planning Association*, 68(3), 279-295.

Fontana, A. and Frey, J. H. 2000, 'The interview: from structured questions to negotiated text', in *Handbook of Qualitative Research*, 2nd edn, eds N. Denzin and Y. Lincoln, Sage Publications, Thousand Oaks.

Fortune, J. and Peters, G. 2005, *Information systems: achieving success by avoiding failure*, John Wiley & Sons Inc, Chichester.

Froschauer, U. and Lueger, M. 2003, *Das qualitative Interview - Zur Praxis interpretativer Analyse sozialer Systeme*, Facultas Verlags- und Buchhandels AG, Vienna.

Gefen, D. and Carmel, E. 2008, 'Is the world really flat? A look at offshoring in an online programming marketplace', *MIS Quarterly*, 32(2), 367-384.

Ghemawat, P. 2007, *Redefining global strategy*, Harvard Business School Publishing, Boston.

Gibson, C. B. 1999, 'Do they do what they believe they can? Group efficacy and group effectiveness across tasks and cultures', *Academy of Management Journal*, 42(2), 138-152.

Gibson, C. B. and Zellmer-Bruhn, M. E. 2001, 'Metaphors and meaning: an intercultural analysis of the concept of teamwork', *Administrative Science Quarterly*, 46(2), 274-303.

Glaser, B. G. and Strauss, A. L. 1967, *The discovery of grounded theory: strategies for qualitative research*, Wiedenfeld and Nicholson, London.

Glaser, G. 1984, 'Managing projects in the computer industry', *Computer*, 17(10), 45-53.

Glaser, J. 2005, 'More on management's role in IT project failures', *Healthcare Financial Management: Journal of the Healthcare Financial Management Association*, 59(1), 82-84.

Glass, L. 1998, *Software runaways: lessons learned from massive software project failures*, Prentice Hall, Englewood Cliffs.

Glass, R. L. 1997, 'Software runaways - some surprising findings', *ACM SIGMIS Database*, 28(3), 16-19.

Glick, W. H., Huber, G. P., Miller, C. C., Doty, D. H. and Sutcliffe, K. M. 1990, 'Studying changes in organizational design and effectiveness: retrospective event histories and periodic assessments', *Organization Science*, 1(3), 293-312.

Gogan, J. L., Fedorowicz, J. and Rao, A. 1999, 'Assessing risks in two projects: a strategic opportunity and a necessary evil', *Communications of the Association for Information Systems*, 1(1), 15.

Gold, T. 2005, *Outsourcing software development offshore*, Auerbach Publications, Boca Raton.

Gonzalez, R., Gasco, J. and Llopis, J. 2006, 'Information systems outsourcing: a literature analysis', *Information and Management*, 43(7), 821-834.

Gopal, A., Mukhopadhyay, T. and Krishnan, M. 2002, 'The role of software processes and communication in offshore software development', *Communications of the ACM*, 45(4), 193-199.

Gopal, A., Sivaramakrishnan, K., Krishnan, M. and Mukhopadhyay, T. 2003, 'Contracts in offshore software development: an empirical analysis', *Management Science*, 49(12), 1671-1683.

Gregor, S. 2006, 'The nature of theory in information systems', *MIS Quarterly*, 30(3), 611-642.

Gumm, D. C. 2006, 'Distribution dimensions in software development projects: a taxonomy', *Software, IEEE*, 23(5), 45-51.

Hatch, P. 2005, 'Preliminary findings and conclusion', viewed 27 February 2010, http://www.ventoro.com/Offshore2005ResearchFindings.pdf.

Havelka, D. and Rajkumar, T. 2006, 'Using the troubled project recovery framework: problem recognition and decision to recover', *E-Service Journal*, 5(1), 43-73.

Havelka, D., Rajkumar, T. and Serve, P. 2004, '*Early indicators of troubled IS development projects'*, Proceedings of the 11th Americas Conference on Information Systems, New York.

Heeks, R., Krishna, S., Nicholson, B. and Sahay, S. 2001, 'Synching or sinking: global software outsourcing relationships', *Software, IEEE*, 18(2), 54-60.

Herbsleb, J. D. and Moitra, D. 2001, 'Global software development', *Software, IEEE*, 18(2), 16-20.

Hertzum, M. and Pries-Heje, J. 2009, '*Coping with cultural and maturity inequality in offshore outsourcing: is minimizing interaction the solution?'*, Proceedings of the 17th European Conference on Information Systems, Verona.

Hinds, P., Liu, L. and Lyon, J. 2011, 'Putting the global in global work: an intercultural lens on the practice of cross-national collaboration', *The Academy of Management Annals*, 5(1), 135-188.

Hinds, P. J. and Mortensen, M. 2005, 'Understanding conflict in geographically distributed teams: the moderating effects of shared identity, shared context, and spontaneous communication', *Organization Science*, 16(3), 290-307.

Hirschheim, D. and Dibbern, J. 2002, 'Information systems outsourcing in the new economy - an introduction', in *Information systems outsourcing - enduring themes, emergent patterns and future directions*, eds D. Hirschheim, A. Heinzl and J. Dibbern, Springer, Berlin.

Hirschheim, D. and Dibbern, J. 2006, 'Information technology outsourcing in the new economy - an introduction to the outsourcing and offshoring landscape', in *Information systems outsourcing - enduring themes, new perspectives and global challenges*, eds D. Hirschheim, A. Heinzl and J. Dibbern, Springer, Berlin.

Hoch, D., Roeding, C., Purkert, G., Linder, S. and Müller, R. 2000, *Secrets of software success management insights from 100 software firms around the world*, Harvard Business School Press, Boston.

Hoegl, M. and Gemuenden, H. G. 2001, 'Teamwork quality and the success of innovative projects: a theoretical concept and empirical evidence', *Organization Science*, 12(4), 435-449.

Hoegl, M., Weinkauf, K. and Gemuenden, H. G. 2004, 'Interteam coordination, project commitment, and teamwork in multiteam R&D projects: a longitudinal study', *Organization Science*, 15(1), 38-55.

Hofstede, G., Neuijen, B., Ohayv, D. D. and Sanders, G. 1990, 'Measuring organizational cultures: a qualitative and quantitative study across twenty cases', *Administrative Science Quarterly*, 35(2), 286-316.

Hofstede, G. H. 1984, *Culture's consequences: international differences in work-related values*, Sage Publications, Beverly Hills.

Hollingshead, A. B., McGrath, J. E. and O'Connor, K. M. 1993, 'Group task performance and communication technology', *Small Group Research*, 24(3), 307-333.

Huang, H. and Trauth, E. M. 2008, '*Cultural influences on temporal separation and coordination in globally distributed software development*', Proceedings of the 29th International Conference on Information Systems, Paris.

Hussey, J. M. and Hall, S. E. 2007, *Managing global development risk*, Auerbach, Boca Raton.

Iacovou, C. L. and Nakatsu, R. 2008, 'A risk profile of offshore-outsourced development projects', *Communications of the ACM*, 51(6), 89-94.

Jarvenpaa, S. L. and Leidner, D. E. 1998, 'Communication and trust in global virtual teams', *Journal of Computer Mediated Communication*, 3(4), 791-815.

Jensen, M. C. and Meckling, W. H. 1976, 'Theory of the firm: managerial behavior, agency costs and ownership structure', *Journal of Financial Economics*, 3(4), 305-360.

Kahai, S. S., Carroll, E. and Jestice, R. 2007, 'Team collaboration in virtual worlds', *ACM SIGMIS Database*, 38(4), 61-68.

Kappelman, L. A., McKeeman, R. and Zhang, L. 2006, 'Early warning signs of IT project failure: the dominant dozen', *Information Systems Management*, 23(4), 31-36.

Karahanna, E., Evaristo, J. R. and Srite, M. 2005, 'Levels of culture and individual behavior: an integrative perspective', *Journal of Global Information Management*, 13(2), 1-20.

Karolak, D. 1998, *Global software development*, IEEE Computer Society, Los Alamitos.

Kasi, V., Keil, M., Mathiassen, L. and Pedersen, K. 2008, 'The post mortem paradox: a Delphi study of IT specialist perceptions', *European Journal of Information Systems*, 17(1), 62-78.

Kataja, A. and Tuunanen, T. 2006, '*Information systems development methods and reducing information asymmetry: a way to decrease project escalation in outsourcing?*', Proceedings of the 14th European Conference on Information Systems, Göteborg.

Keil, M. 1995, 'Pulling the plug: software project management and the problem of project escalation', *MIS Quarterly*, 19, 421-448.

Keil, M., Cule, P. E., Lyytinen, K. and Schmidt, R. C. 1998, 'A framework for identifying software project risks', *Communications of the ACM*, 41(11), 76-83.

Keil, M., Mann, J. and Rai, A. 2000, 'Why software projects escalate: an empirical analysis and test of four theoretical models', *MIS Quarterly*, 24(4), 631-664.

Keil, M. and Montealegre, R. 2000, 'Cutting your losses: extricating your organization when a big project goes awry', *Sloan Management Review*, 41(3), 55-68.

Keil, M. and Robey, D. 2001, 'Blowing the whistle on troubled software projects', *Communications of the ACM*, 44(4), 87-93.

Kelly, S., Noonan, C. and Vidolov, S. 2010, '*Facilitating productive collaboration in offshore software development work: project management as sociomaterial "sense-shaping"*', Global Sourcing Workshop, Zermatt.

Kern, T. and Willcocks, L. 2000, 'Exploring information technology outsourcing relationships: theory and practice', *The Journal of Strategic Information Systems*, 9(4), 321-350.

King, W. R. and Torkzadeh, G. 2008, 'Information systems offshoring: research status and issues', *MIS Quarterly*, 32(2), 205-225.

Kirk, J. and Miller, M. L. 1986, *Reliability and validity in qualitative research*, Sage Publications, Beverly Hills.

Kitayama, S. 2002, 'Culture and basic psychological processes - toward a system view of culture: comment on Oyserman et al.(2002)', *Psychological Bulletin*, 128(1), 89-96.

Klakegg, O. J., Williams, T., Walker, D., Andersen, B. and Magnussen, O. 2010, *Early warning signs in complex projects*, Project Management Institute, Newtown Square.

Knippenberg, D. and Schie, E. 2000, 'Foci and correlates of organizational identification', *Journal of Occupational and Organizational Psychology*, 73(2), 137-147.

Koh, C., Ang, S. and Straub, D. W. 2004, 'IT outsourcing success: a psychological contract perspective', *Information Systems Research*, 15(4), 356-373.

Kotlarsky, J. and Oshri, I. 2005, 'Social ties, knowledge sharing and successful collaboration in globally distributed system development projects', *European Journal of Information Systems*, 14(1), 37-48.

Kotlarsky, J., van Fenema, P. and Willcocks, L. 2006, '*Case research in global software projects: coordinating through knowledge*', Proceedings of the 27th International conference on information systems, Milwaukee.

Kraut, R. E. and Streeter, L. A. 1995, 'Coordination in software development', *Communications of the ACM*, 38(3), 69-81.

Krishna, S., Sahay, S. and Walsham, G. 2004, 'Managing cross-cultural issues in global software outsourcing', *Communications of the ACM*, 47(4), 62-66.

Lacity, M. C., Khan, S., Yan, A. and Willcocks, L. P. 2010, 'A review of the IT outsourcing empirical literature and future research directions', *Journal of Information Technology*, 25(4), 395-433.

Lacity, M. C., Khan, S. A. and Willcocks, L. P. 2009, 'A review of the IT outsourcing literature: insights for practice', *The Journal of Strategic Information Systems*, 18(3), 130-146.

Lakhanpal, B. 1993, 'Understanding the factors influencing the performance of software development groups: an exploratory group-level analysis', *Information and Software Technology*, 35(8), 468-473.

Lane, M. and Agerfalk, P. 2007, '*Expectations between parties playing similar roles in global software development: a psychological contract perspective*', Proceedings of the 15th European Conference on Information Systems, St. Gallen.

Lea, M. and Spears, R. 1991, 'Computer-mediated communication, de-individuation and group decision-making', *International Journal of Man-Machine Studies*, 34(2), 283-301.

Lee-Kelley, L., Crossman, A. and Cannings, A. 2004, 'A social interaction approach to managing the "invisibles" of virtual teams', *Industrial Management and Data systems*, 104(8), 650-657.

Lee-Kelley, L. and Sankey, T. 2008, 'Global virtual teams for value creation and project success: a case study', *International Journal of Project Management*, 26(1), 51-52.

Lee, A. S. and Baskerville, R. L. 2003, 'Generalizing generalizability in information systems research', *Information Systems Research*, 14(3), 221-243.

Lee, J. N., Huynh, M. Q. and Hirschheim, R. 2008, 'An integrative model of trust on IT outsourcing: examining a bilateral perspective', *Information Systems Frontiers*, 10(2), 145-163.

Lee, J. N., Huynh, M. Q., Kwok, R. C. W. and Pi, S. M. 2003, 'IT outsourcing evolution - past, present, and future', *Communications of the ACM*, 46(5), 84-89.

Leidner, D. E. and Kayworth, T. 2006, 'A review of culture in information systems research: toward a theory of information technology culture conflict', *MIS Quarterly*, 30(2), 357-399.

Leidner, D. E., Pan, G. and Pan, S. L. 2009, 'The role of IT in crisis response: lessons from the SARS and Asian Tsunami disasters', *The Journal of Strategic Information Systems*, 18(2), 80-99.

Leung, K., Bhagat, R. S., Buchan, N. R., Erez, M. and Gibson, C. B. 2005, 'Culture and international business: recent advances and their implications for future research', *Journal of International Business Studies*, 36(4), 357-378.

Levina, N. and Vaast, E. 2008, 'Innovating or doing as told? Status differences and overlapping boundaries in offshore collaboration', *MIS Quarterly*, 32(2), 307-332.

Likert, R. 1967, *The human organization: its management and values*, McGraw-Hill, New York.

Linberg, K. R. 1999, 'Software developer perceptions about software project failure: a case study', *Journal of Systems and Software*, 49(2), 177-192.

Loosemore, M. 2000, *Crisis management in construction projects*, American Society of Civil Engineers, Danvers.

Lucas, H. C. 1975, *Why information systems fail*, Columbia University Press, New York.

Lyytinen, K. and Hirschheim, R. 1987, 'Information systems failures - a survey and classification of the empirical literature', in *Oxford surveys in information technology*, eds P. Zorkoczy, Oxford University Press, Oxford.

Lyytinen, K. and Robey, D. 1999, 'Learning failure in information systems development', *Information Systems Journal*, 9(2), 85-101.

MacDuffie, J. P. 2007, 'HRM and Distributed Work', *The Academy of Management Annals*, 1(1), 549-615.

Mähring, M., Keil, M., Mathiassen, L. and Pries-Heje, J. 2008, 'Making IT project de-escalation happen: an exploration into key roles', *Journal of the Association for Information Systems*, 9(8), 462-496.

Malone, T. W. and Crowston, K. 1990, '*What is coordination theory and how can it help design cooperative work systems?*', Proceedings of the 1990 ACM Conference on Computer Supported Cooperative Work, Los Angeles, ACM.

Malone, T. W. and Crowston, K. 1994, 'The interdisciplinary study of coordination', *ACM Computing Surveys (CSUR)*, 26(1), 87-119.

Martins, L. L., Gilson, L. L. and Maynard, M. T. 2004, 'Virtual teams: what do we know and where do we go from here?', *Journal of Management*, 30(6), 805-835.

Mayring, P. 2002, *Einführung in die qualitative Sozialforschung*, 5th edn, Beltz Verlag, Weinheim.

Maznevski, M. L. and Chudoba, K. M. 2000, 'Bridging space over time: global virtual team dynamics and effectiveness', *Organization Science*, 11(5), 473-492.

McFarlan, F. W. 1981, 'Portfolio approach to information systems', *Harvard Business Review*, 59(5), 142-150.

McGrath, J. E. 1984, *Groups: interaction and performance*, Prentice-Hall, Englewood Cliffs.

McGrath, J. E. 1991, 'Time, interaction, and performance (TIP): a theory of groups', *Small Group Research*, 22(2), 147-174.

McManus, J. and Wood-Harper, T. 2007, 'Understanding the sources of information systems project failure', *Management Services*, 51, 38-43.

Mennecke, B. E., Hoffer, J. A. and Wynne, B. E. 1992, 'The implications of group development and history for group support system theory and practice', *Small Group Research*, 23(4), 524-572.

Metiu, A. 2006, 'Owning the code: status closure in distributed groups', *Organization Science*, 17(4), 418-435.

Miles, M. B. and Huberman, A. M. 1984, *Qualitative data analysis: a sourcebook of new methods*, Sage publications, Beverly Hills.

Montoya-Weiss, M. M., Massey, A. P. and Song, M. 2001, 'Getting it together: temporal coordination and conflict management in global virtual teams', *Academy of Management Journal*, 44(6), 1251-1262.

Myers, M. D. 2008, *Qualitative research in business and management*, Sage Publications, London.

Myers, M. D. and Newman, M. 2007, 'The qualitative interview in IS research: examining the craft', *Information and Organization*, 17(1), 2-26.

Narayanaswamy, R. and Henry, R. M. 2005, '*Effects of culture on control mechanisms in offshore outsourced IT projects*', Proceedings of the 2005 ACM SIGMIS CPR Conference on Computer Personnel Research, Atlanta, ACM.

Nelson, R. R. 2005, 'Project retrospectives: evaluating project success, failure, and everything in between', *MIS Quarterly Executive*, 4(3), 361-372.

Newman, K. L. and Nollen, S. D. 1996, 'Culture and congruence: the fit between management practices and national culture', *Journal of International Business Studies*, 27(4), 753-779.

Nicholson, B. 1999, *An analysis of the process of the information systems development across time and space: the case of outsourcing to India*, University of Salford, PhD thesis.

Nicholson, B. and Sahay, S. 2004, 'Embedded knowledge and offshore software development', *Information and Organization*, 14(4), 329-365.

Nikander, I. O. 2002, *Early warnings: a phenomenon in project management*, Helsinki University of Technology, PhD thesis.

Nikander, I. O. and Eloranta, E. 2001, 'Project management by early warnings', *International Journal of Project Management*, 19(7), 385-399.

Ocasio, W. 1998, 'Towards an attention-based view of the firm', *Strategic Management Journal*, 18(S1), 187-206.

Orlikowski, W. and Baroudi, J. 1991, 'Studying information technology in organizations: research approaches and assumptions', *Information Systems Research*, 2(1), 1-28.

Oshri, I., Kotlarsky, J. and Willcocks, L. 2009, *The handbook of global outsourcing and offshoring*, 1st edn, Palgrave Macmillan, Hampshire.

Oshri, I., Kotlarsky, J. and Willcocks, L. 2011, *The handbook of global outsourcing and offshoring*, 2nd edn, Palgrave Macmillan, Hampshire.

Oshri, I., van Fenema, P. and Kotlarsky, J. 2008, 'Knowledge transfer in globally distributed teams: the role of transactive memory', *Information Systems Journal*, 18(6), 593-616.

Oxford 1993, *The concise Oxford dictionary of current English*, 8th edn, Oxford University Press.

Oz, E. 1994, 'When professional standards are lax: the CONFIRM failure and its lessons', *Communications of the ACM*, 37(10), 29-43.

Padma, T., Daniel, S. and Yamin, K. 2012, 'Asian tsunami alert systems 'pass major test'', viewed 26 March 2013, http://www.scidev.net/en/agriculture-and-environment/tsunami/news/asian-tsunami-alert-systems-pass-major-test-.html.

Patton, M. Q. 2002, *Qualitative research and evaluation methods*, 3rd edn, Sage Publications, Thousand Oaks.

Peterson, D. K., Kim, C., Kim, J. H. and Tamura, T. 2002, 'The perceptions of information systems designers from the United States, Japan, and Korea on success and failure factors', *International Journal of Information Management*, 22(6), 421-439.

Philip, T., Schwabe, G. and Ewusi-Mensah, K. 2009, '*Critical issues of offshore software development project failures*', Proceedings of the 30th International Conference on Information Systems, Phoenix, USA.

Philip, T., Schwabe, G. and Wende, E. 2010, '*Identifying early warning signs of failures in offshore software development projects - a Delphi survey*', Proceedings of the 16th Americas Conference on Information Systems, Lima, Peru.

Philip, T., Wende, E. and Schwabe, G. 2012, 'Exploring failures at the team level in offshore-outsourced software development projects', in *The dynamics of global sourcing: perspectives and practices*, eds J. Kotlarsky, I. Oshri and L. Willcocks, Springer-Verlag, Berlin.

Philip, T., Wende, E. and Schwabe, G. 2013a, '*Exploring early warning signs of failure in offshore-outsourced software development projects at the team level*', Proceedings of the 21st European Conference on Information Systems, Utrecht, The Netherlands.

Philip, T., Wende, E. and Schwabe, G. 2013b, '*Exploring the contribution of problems in team-level functionality to the failure of offshore-outsourced software projects*', Proceedings of the 17th Pacific Asia Conference on Information Systems, Jeju Island, South Korea.

Philip, T., Wende, E. and Schwabe, G. 2013c, '*Why project managers fail to act upon early warning signs: evidence from failed offshore-outsourced software projects*', Proceedings of the 21st European Conference on Information Systems, Utrecht, The Netherlands.

Pinto, J. K. and Mantel , S. J. 1990, 'The causes of project failure', *IEEE Transactions on Engineering Management*, 37(4), 269-276.

Prahalad, C. K. and Hamel, G. 1990, 'The Core Competence of the Corporation', *Harvard Business Review*, 3(May-June), 75-91.

Prifling, M., Gregory, R. and Beck, R. 2009, '*Project control in IT offshore outsourcing projects: from behaviour control to output control to good client-vendor relationship*', Proceedings of the Wirtschaftsinformatik 2009, Vienna.

Prikladnicki, R. and Audy, J. L. N. 2009, '*Comparing offshore outsourcing and the internal offshoring of software development: a qualitative study*', Proceedings of the 15th Americas Conference on Information Systems, San Francisco.

Ramasubbu, N., Mithas, S., Krishnan, M. and Kemerer, C. F. 2008, 'Work dispersion, process-based learning, and offshore software development performance', *MIS Quarterly*, 32(2), 437-458.

Ramesh, V. and Dennis, A. R. 2002, '*The object-oriented team: lessons for virtual teams from global software development*', Proceedings of the 35th Hawaii International Conference on System Sciences.

Ropponen, J. and Lyytinen, K. 2000, 'Components of software development risk: how to address them? A project manager survey', *IEEE Transactions on Software Engineering*, 26(2), 98-112.

Ross, S. A. 1973, 'The economic theory of agency: the principal's problem', *The American Economic Review*, 63(2), 134-139.

Rottman, J. and Lacity, M. 2008, 'A US Client's learning from outsourcing IT work offshore', *Information Systems Frontiers*, 10(2), 259-275.

Rottman, J. W. and Lacity, M. C. 2006, 'Proven practices for effectively offshoring proven practices for effectively offshoring IT work', *MIT Sloan Management Review*, 47(3), 56-63.

Rudloff, A., Lauterjung, J., Münch, U. and Tinti, S. 2009, 'The GITEWS Project (German-Indonesian Tsunami Early Warning System)', *Natural Hazards Earth System Sciences*, 9(4), 1381-1382.

Sabherwal, R. 2003, 'The evolution of coordination in outsourced software development projects: a comparison of client and vendor perspectives', *Information and Organization*, 13(3), 153-202.

Sahay, S., Nicholson, B. and Krishna, S. 2003, *Global IT outsourcing: software development across borders*, Cambridge University Press, Cambridge.

Sahay, S. and Walsham, G. 1997, 'Social structure and managerial agency in India', *Organization Studies*, 18(3), 415-444.

Sakthivel, S. 2007, 'Managing risk in offshore systems development', *Communications of the ACM*, 50(4), 69-75.

Sakthivel, S. 2012, 'Cost estimation of globally outsourced IS development projects', *Journal of Information Technology Management*, 13(1), 34-45.

Sanchez, A. and Perez, M. 2004, 'Early warning signals for R&D projects: an empirical study', *Project Management Journal*, 35(1), 11-23.

Sarker, S. and Sahay, S. 2003, 'Understanding virtual team development: an interpretive study', *Journal of the Association for Information Systems*, 4(1), 1-38.

Sauer, C. 1993, *Why information systems fail: a case study approach*, Alfred Waller, Henley.

Saunders, C., Van Slyke, C. and Vogel, D. R. 2004, 'My time or yours? Managing time visions in global virtual teams', *Academy of Management Executive*, 18(1), 19-31.

Schmidt, R., Lyytinen, K., Keil, M. and Cule, P. 2001, 'Identifying software project risks: an international Delphi study', *Journal of Management Information Systems*, 17(4), 5-36.

Sharma, R., Madireddy, V., Jain, V. and Apoorva, S. 2008, 'Best practices for communication between client and vendor in IT outsourcing projects', *Journal of Information, Information Technology, and Organizations*, 3, 61-93.

Short, J., Williams, E. and Christie, B. 1976, *The social psychology of telecommunications*, John Wiley & Sons, London.

Sidhu, J. S. and Volberda, H. W. 2011, 'Coordination of globally distributed teams: a co-evolution perspective on offshoring', *International Business Review*, 20(3), 278-290.

Siegel, J., Dubrovsky, V., Kiesler, S. and McGuire, T. W. 1986, 'Group processes in computer-mediated communication', *Organizational Behavior and Human Decision Processes*, 37(2), 157-187.

Smith, H. and and McKeen, J. 2004, 'Developments in practice XIV: IT sourcing - how far can you go?', *Communications of the Association for Information Systems*, 13(1).

Smith, J. 2001, *Troubled IT projects: prevention and turnaround*, The Institution of Electrical Engineers, Stevenage.

Snowden, D. J. and Boone, M. E. 2007, 'A leader's framework for decision making', *Harvard Business Review*, 85(11), 68-76.

Sobolev, S. V., Babeyko, A. Y., Wang, R., Hoechner, A., Galas, R., Rothacher, M., Sein, D. V., Schröter, J., Lauterjung, J. and Subarya, C. 2007, 'Tsunami early warning using GPS-Shield arrays', *Journal of Geophysical Research*, 112(B8), 1-18.

Sparrow, E. 2003, *Successful IT outsourcing: from choosing a provider to managing the project*, Springer Verlag, London.

Spencer-Oatey, H. 2004, *Culturally speaking*, Continuum, New York.

Standish 1995, *The CHAOS report into project failure*, The Standish Group International Inc, Boston.

Standish 2004, *The CHAOS report into project failure*, The Standish Group International Inc, Boston.

Standish 2009, *CHAOS summary 2009 - 10 laws of CHAOS*, The Standish Group International Inc, Boston.

Standish 2010, *CHAOS summary 2010*, The Standish Group International Inc, Boston.

Stebbins, R. A. 2001, *Exploratory research in the social sciences*, Sage Publications, Inc.

Strauss, A. L. and Corbin, J. 1990, *Basics of qualitative research*, Sage publications, Newbury Park.

Sutton, R. I. and Staw, B. M. 1995, 'What theory is not', *Administrative Science Quarterly*, 40(3), 371-384.

Szulanski, G. 1996, 'Exploring internal stickiness: impediments to the transfer of best practice within the firm', *Strategic Management Journal*, 17(Winter special), 27-43.

Taylor, H. 2006, 'Critical risks in outsourced IT projects: the intractable and the unforeseen', *Communications of the ACM*, 49(11), 74-79.

Trompenaars, F. 1993, *Riding the waves of culture: understanding cultural diversity in business*, Nicole Brealey Publishing, London.

Tuckman, B. W. 1965, 'Developmental sequence in small groups', *Psychological Bulletin*, 63(6), 384-399.

Van de Ven, A. H. 1989, 'Nothing is quite so practical as a good theory', *Academy of management review*, 14(4), 486-489.

Vashistha, A. and Vashistha, A. 2005, *The offshore nation: the rise of services globalization*, Tata McGraw-Hill Publishing Company Limited, New York.

Vlaar, P. W. L., van Fenema, P. C. and Tiwari, V. 2008, 'Cocreating understanding and value in distributed work: how members of onsite and offshore vendor teams give, make, demand, and break sense', *MIS Quarterly*, 32(2), 227-255.

Wallace, L. and Keil, M. 2004, 'Software project risks and their effect on outcomes', *Communications of the ACM*, 47(4), 68-73.

Wallace, L., Keil, M. and Rai, A. 2004, 'How software project risk affects project performance: an investigation of the dimensions of risk and an exploratory model', *Decision Sciences*, 35(2), 289-321.

Walsham, G. 1995, 'Interpretive case studies in IS research: nature and method', *European Journal of Information Systems*, 4(2), 74-81.

Walsham, G. 2002, 'Cross-cultural software production and use: a structurational analysis', *MIS Quarterly*, 26(4), 359-380.

Ward, J. and Daniel, E. 2006, *Benefits management: delivering value from IS and IT investments*, John Wiley & Sons Ltd, Chichester.

Ward, L. 2003, 'Recognizing project warning signs', viewed 16 August, 2008, http://www.esi-intl.com/public/publications/122003executivewarningsigns.asp.

Warkentin, M. E., Sayeed, L. and Hightower, R. 1997, 'Virtual teams versus face-to-face teams: an exploratory study of a web-based conference system', *Decision Sciences*, 28(4), 975-996.

Wateridge, J. 1995, 'IT projects: a basis for success', *International Journal of Project Management*, 13(3), 169-172.

Watkins, M. D. and Bazerman, M. H. 2003, 'Predictable surprises: the disasters you should have seen coming', *Harvard Business Review*, 81(3), 72-85.

Weber, R. 2004, 'Editor's comments: the rhetoric of positivism versus interpretivism: a personal view', *MIS Quarterly*, 28(1), iii-xii.

Wende, E., Schwabe, G. and Philip, T. 2010, 'Exploring the media mix during IT-offshore project', in *Global sourcing of information technology and business processes*, eds I. Oshri and J. Kotlarsky, Springer-Verlag, Berlin.

Wiener, M. 2006, *Critical success factors of offshore software development projects: the perspective of German-speaking companies*, Deutscher Universitäts-Verlag.

Wiener, M., Vogel, B. and Amberg, M. 2010, 'Information systems offshoring - a literature review and analysis', *Information Systems*, 27(1), 455-492.

Willcocks, L. P., Cullen, S. and Craig, A. 2010, *The outsourcing enterprise: from cost management to collaborative innovation*, Palgrave Macmillan, Hampshire.

Williams, T., Jonny Klakegg, O., Walker, D. H. T., Andersen, B. and Morten Magnussen, O. 2012, 'Identifying and acting on early warning signs in complex projects', *Project Management Journal*, 43(2), 37-53.

Winkler, J., Dibbern, J. and Heinzl, A. 2007, 'Der Einfluss kulturelle Unterscheide beim IT-Offshoring', *Wirtschaftsinformatik*, 19(2), 95-103.

Yeo, K. 2002, 'Critical failure factors in information system projects', *International Journal of Project Management*, 20(3), 241-246.

Yin, R. K. 2003, *Case study research: design and methods*, 3rd edn, Sage Publications, Thousand Oaks.

Yourdon, E. 2003, *Death march*, 2nd edn, Prentice Hall, Upper Saddle River.

Appendices

Appendix A – TIP theory propositions

Proposition 1: Groups are assumed to be complex, intact social systems that engage in multiple, interdependent functions, on multiple, concurrent projects, while partially nested within, and loosely coupled to, surrounding systems.

Proposition 2: All group action involves one or another of four modes of group activity:
Mode I: inception and acceptance of a project (goal choice)
Mode II: solution of technical issues (means choice)
Mode III: resolution of conflict, that is, of political issues (policy choice), and
Mode IV: execution of the performance requirements of the project (goal attainment).

Proposition 3: The four modes of activity are not a fixed sequence of phases but, rather, are a set of alternative kinds of activity in which the group and its members may engage.

Proposition 4: Behavior in work group shows many forms of complex temporal patterning, including

1. temporal aspects of the flow of work in groups, which raise issues of scheduling, synchronization, and time allocation (see proposition 5)
2. problems of efficiently matching periods of time with bundles of activities (see proposition 6), and
3. entrainment processes leading to patterns of synchronization, both of group members' behavior with one another, and of group behavior with "external" events (see proposition 7).

Proposition 5: All collective action entails (at least) three generic temporal problems that both organizations and individuals must reckon with. The three generic temporal problems are

1. temporal ambiguity (when particular events will occur and recur and how long they will last)
2. conflicting temporal interests and requirements, and
3. scarcity of temporal resources.

Proposition 6: A temporally efficient flow of work in groups requires complex matching of bundles of activities to particular periods of time.

Proposition 7: One major form of temporal patterning is social entrainment.

Proposition 8: In TIP theory, *group interaction process* refers to the flow of work in groups at a micro level.

Proposition 9: In TIP theory, it is assumed that at any point in interaction, a group has a current purpose or objective that can be regarded as its focal task.

Proposition 10: Each act can be regarded as either germane to the group's current "focal task" or not germane to it.

Proposition 11: Acts have situated, rather than generic, meanings in relation to the modes, functions, and paths of group activity.

Proposition 12: Various aspects of the flow of work in groups are reflected in different forms of aggregations of acts.

Appendix B – EWSs of failures and their management stages in failed cases

Project team building efforts

Early warning issues	Early signals	Detected	Acknowledged	Addressed
Absence of trust between vendor and client teams [A, B, N, O]	Vendor offshore team's efforts not appreciated by client team [O]	Yes	No	No
	Lack of opportunities for informal interactions [N]	No	No	No
	Lack of opportunities for informal interactions [O]	Yes	No	No
	Expectation gaps in technical deliverables [A]	Yes	Yes	Yes
	Expectation gaps in technical deliverables [B]	Yes	Yes	No
Lack of team-building exercises by client and vendor [D, K, N, P]	Managers ignore team-building efforts [K]	No	No	No
	Managers ignore team-building efforts [P]	No	No	No
	Lack of project	No	No	No

	team kickoff meetings [D]			
	Lack of procedures to integrate new team members [N]	No	No	No

Shared project execution structures

Early warning issues	Early signals	Detected	Acknowledged	Addressed
Lack of a common understanding about deliverables [A, J, L, P]	Expectation gaps in deliverables [A]	Yes	Yes	No
	Expectation gaps in deliverables [J]	Yes	No	No
	Expectation gaps in deliverables [P]	Yes	No	No
	Lack of explicitly agreed project outputs [L]	No	No	No
Vendor offshore team fails to honor deadlines [A, I, J, L]	Deadlines not met by vendor offshore team [I]	Yes	No	No
	Deadlines not met by vendor offshore team [J]	Yes	No	No
	Deadlines not met by vendor offshore team [L]	Yes	No	No
	Escalations not addressed promptly [A]	Yes	Yes	No

Lack of shared concepts for project execution [D, G, K, O]	Vendor and client teams have different methodologies, documentation, and change management processes [D]	No	No	No
	Vendor and client teams have different methodologies, documentation, and change management processes [O]	Yes	Yes	Yes
	Lack of identical software and hardware versions at client and offshore sites [G]	Yes	No	No
	Lack of identical software and hardware versions at client and offshore sites [K]	Yes	No	No
Business requirements not understood properly by vendor team	Expectation gaps in technical deliverables [A]	Yes	Yes	No
	Expectation gaps in technical	Yes	No	No

members [A, K, L, N, P]	deliverables [N]			
	Ambiguous requirements with room for misinterpretations [K]	No	No	No
	Ambiguous requirements with room for misinterpretations [L]	No	No	No
	Ambiguous requirements with room for misinterpretations [N]	Yes	No	No
	Requirement assumptions by vendors are not verified [P]	Yes	No	No

Collaboration between teams

Early warning issues	**Early signals**	**Detected**	**Acknowledged**	**Addressed**
Lack of collaboration between vendor teams [B, N, O]	Lack of regular meetings [B]	Yes	No	No
	Lack of regular meetings [N]	No	No	No
	Lack of regular meetings [O]	Yes	Yes	Yes

	Missing interaction between vendor offshore and onsite teams [B]	Yes	No	No
	Missing interaction between vendor offshore and onsite teams [O]	Yes	Yes	Yes
	Vendor offshore and onsite teams are part of independent organizations and both are not integrated into the project [B]	Yes	No	No
Lack of agreed communication structures between vendor and client teams [C, N, O]	Communication paths are not clear for team members [C]	No	No	No
	Communication paths are not clear for team members [N]	No	No	No
	Lack of interactions between client and vendor teams [N]	No	No	No
	Lack of interactions between client and	Yes	Yes	No

	vendor teams [O]			
Client team mistrusts vendor offshore team members [O]	Client team member changes use cases without informing vendor offshore team [O]	Yes	No	No
	Lack of interaction between client and vendor offshore teams [O]	Yes	Yes	Yes
	Vendor offshore team not respected or appreciated by client team [O]	Yes	No	No

Awareness of shared work context

Early warning issues	**Early signals**	**Detected**	**Acknowledged**	**Addressed**
Escalations not taken seriously by vendor [A, B]	Assurance of normality by vendor when issues are raised [B]	Yes	No	No
	Repeated expectation gaps in deliverables [A]	Yes	Yes	No
Vendor onsite team lacks motivation to work with offshore team	Missing interaction between vendor offshore and onsite teams [O]	Yes	Yes	Yes
	Vendor onsite	Yes	Yes	Yes

[O]	team does not provide the requested information [O]			
Lack of openness to discuss problems by vendor offshore team [A, I]	Delays of deliverables not communicated in advance [A]	Yes	Yes	Yes
	Non-admission of technical problems or mistakes [I]	Yes	No	No
Insufficient cultural intelligence among vendor and client teams [I, L, R]	Vendor offshore team members do not challenge requirements [I]	Yes	No	No
	Vendor offshore team members do not challenge requirements [L]	No	No	No
	Vendor offshore team members do not talk openly in meetings in the presence of superior [C]	Yes	No	No
	Vendor offshore team members do not talk openly in meetings in the presence of superior [R]	No	No	No

Team member competencies

Early warning issues	Early signals	Detected	Acknowledged	Addressed
Vendor offshore team lacks domain-specific knowledge [B, K, Q]	Knowledge feedback mechanism shows lack of adequate business knowledge [Q]	Yes	No	No
	Lack of SME in the vendor offshore team [N]	No	No	No
	Lack of SME in the vendor offshore team [Q]	Yes	No	No
	Key vendor offshore team members leave the project [B]	Yes	No	No
	Key vendor offshore team members leave the project [K]	Yes	No	No
Project team cannot elicit business specifications thoroughly [E, I, Q]	Lack of SME in the vendor onsite or offshore team involved in requirement analysis [E]	No	No	No
	Lack of SME in	Yes	No	No

	the vendor onsite or offshore team involved in requirement analysis [Q]			
	Lack of team members with organization-specific knowledge involved in requirement analysis [I]	No	No	No
Vendor offshore team members lack communication competency [A, B]	Offshore team members are non-communicative or silent [A]	Yes	Yes	Yes
	Offshore team members are non-communicative or silent [B]	Yes	Yes	No
Vendor team members lack required technical skills [A, B, C, K, H, Q]	Low quality of technical deliverables [A]	Yes	Yes	No
	Low quality of technical deliverables [C]	Yes	No	No
	Low quality of technical deliverables [Q]	Yes	No	No
	Expectation gaps in technical	Yes	Yes	No

	deliverables [A]			
	Expectation gaps in technical deliverables [K]	Yes	No	No
	Expectation gaps in technical deliverables [H]	Yes	No	No
	Key vendor offshore team members leave the project [B]	Yes	No	No

Onshore-offshore team coordination

Early warning issues	**Early signals**	**Detected**	**Acknowledged**	**Addressed**
Lack of onshore-offshore team coordination know-how by client and vendor [B, E, F, M, N, O, P]	Neither vendor nor client project managers have experience in distributed or virtual projects [M]	Yes	No	No
	Nether vendor nor client project managers have experience in distributed or virtual projects [O]	Yes	Yes	Yes
	Neither vendor nor client project	Yes	No	No

	managers have experience in distributed or virtual projects [P]			
	Lack of a shared project plan [F]	No	No	No
	Lack of an integrated organization chart with defined contact persons [F]	No	No	No
	Vendor offshore managers manage large teams [B]	Yes	No	No
	Vendor offshore managers manage large teams [N]	Yes	No	No
Vendor onsite team fails to transfer knowledge to offshore team properly [H, N]	Knowledge feedback mechanism shows lack of understanding by vendor offshore team [H]	Yes	No	No
	Knowledge feedback mechanism shows lack of understanding by vendor offshore team [N]	No	No	No

Vendor onsite team simply expects the offshore team to provide deliverables based on specifications [N, O, P, Q]	Lack of regular meetings [N]	Yes	No	No
	Lack of knowledge feedback mechanisms [P]	Yes	No	No
	Lack of knowledge feedback mechanisms [Q]	Yes	No	No
	Complex knowledge areas not identified [O]	Yes	Yes	Yes
	Questions from vendor offshore team are blocked by vendor onsite team [N]	No	No	No
	Questions from vendor offshore team are blocked by vendor onsite team [P]	Yes	No	No